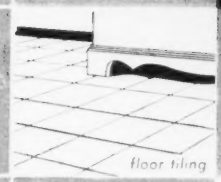
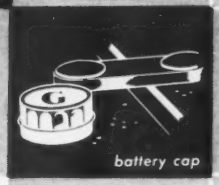
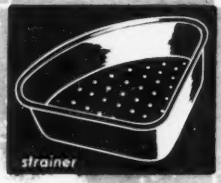
News about

B. F. Goodrich Chemical Company *raw materials*







improve your rubber compounding -cut costs, too!

...WITH Good-rite RESIN 50

GOOD-RITE Resin 50 is an easy-processing reinforcing agent with advantages that cut rubber compounding costs—and improve finished products.

It affords a new and simple compounding approach to hardness problems. For example, it's a means of filling in the gap between soft rubber compounds and ebonites.

More advantages! It saves time by eliminating masterbatching. It gives rubber compounds better flex life . . . higher elongation . . . improved abrasion resistance . . . and easier handling because Resin 50 acts as a plasticizer at processing temperatures.

In extruding gaskets, tubing, coving, etc. —especially on hard compounds—Resin 50 provides improved surface smoothness and superior processing characteristics in the extruder.

Good-rite Resin 50 is a white, free-flowing powder. It can be compounded in a wide range of attractive colors. Send for technical bulletins. Find out how Good-rite Resin 50 improves rubber compounding, cuts costs too. Please address Dept. CA-1, B.F.Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
Reg. U.S. Pat. Off.
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

Philblack* O *stands stress plus heat*

For conveyor belts it can't be beat!

More truth than poetry in that one! For remarkable stress-strain properties, exceptional abrasion resistance, excellent flex life and good aging qualities . . . use Philblack O in your rubber compound. High conductivity . . . which minimizes buildup of dangerous static electricity . . . is another big plus for manufacturers of tire treads, conveyor belts, industrial hose and many other rubber products.

The Philblack Sales Service Laboratory is staffed and equipped to help with your rubber problems . . . ready to assist you in determining proper compounding procedures and recipes for optimum results in GR-S, low temperature polymers and natural rubber. Philblack O is shipped in bulk or bags. Firm, dense pellets handle efficiently in hopper cars and most bulk conveyor systems.

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

EVANS BUILDING • AKRON 8, OHIO

PHILBLACK EXPORT SALES DIVISION • 80 BROADWAY • NEW YORK 5, N. Y.

* A Trademark

Philblack A and Philblack O are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton.
West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

For easier-processing vinyls

PLIOVIC

PLIOVIC means easier processing in vinyls—on the mills, in the Banbury, on the calenders and in the extruders—because the chemical composition of these Goodyear vinyl chloride copolymer resins permits their processing at lower temperatures than similar copolymers.

PLIOVIC A and AR are in use in calendered films and flooring, extruded hose and tubing. PLIOVIC AO is being used in clear and colored unsupported cast films and in coatings for fabrics and papers. In either form, these resins yield tough, high-strength, long-wearing products with good light and heat stability, good chemical resistance and — in the case of films and coatings—with heat seals at 250°F-275°F.

Look over this list of properties and uses. See for yourself how PLIOVIC will fit into your production plans. Then write for full details and sample for your own evaluation to:

GOODYEAR
CHEMICAL DIVISION
AKRON 16, OHIO

To Help You Evaluate PLIOVIC

Composition . . . . .
Vinyl Chloride Copolymer
Form . . . . . Fine White Powder
Specific Gravity 1.39
Bulking Values
PLIOVIC A and AR—22 lbs./cu. ft.
PLIOVIC AO—15 lbs./cu. ft.
Softening Point . . . . . 187°F
Moisture Content . . 2.0% maximum
Intrinsic Viscosity 0.800-0.950
Solubility . . . . . Very limited. 12-15% solids solution can be made in ketones at elevated temperatures.
Color . . . . . None
Taste . . . . . None
Olsen Flow Temperature . . 296°F — 1 in./2 min. @ 1500 psi

USE PROVED Products

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

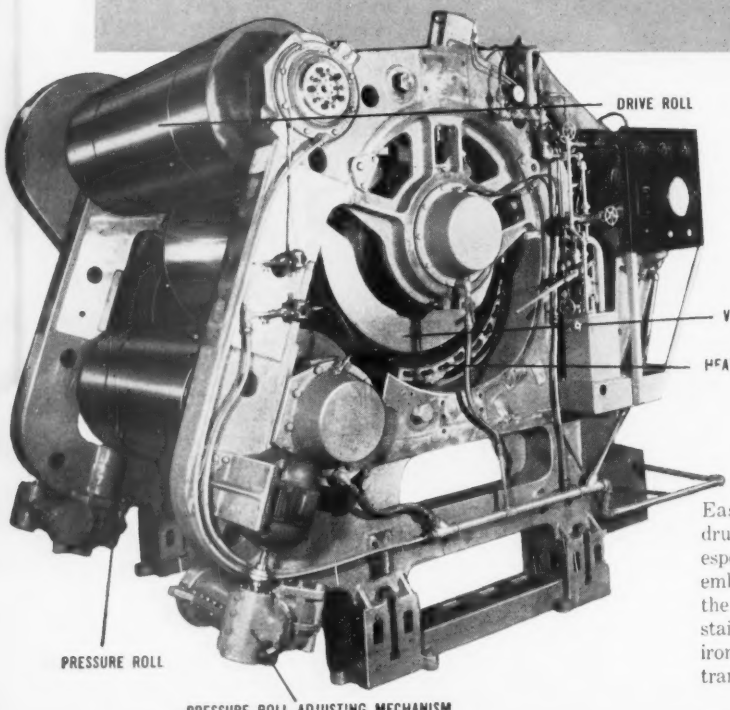
Pliovic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

A completely new and redesigned

FOR CONTINUOUS

Permits roll and belt

A NEW ROTOCURE, DESIGNED TO GREATLY FACILITATE REMOVAL OF THE VULCANIZING DRUM AND REPLACEMENT OF THE STEEL BAND, IS NOW AVAILABLE AS A RESULT OF COOPERATIVE ENGINEERING BY ADAMSON UNITED COMPANY AND BOSTON WOVEN HOSE AND RUBBER COMPANY



Easy removal of the Vulcanizing drum to make quick roll changes is especially important when use of an embossed curing roll is necessary, as in the production of floor matting and stair treads. The changing of edge irons when producing conveyor or transmission belting is also facilitated.

The pressure (gauging) roll will withstand a separating force of 250,000 pounds per adjusting screw. It is contemplated that certain stocks can be calendered and cured in a single operation, gauging being accomplished between the pressure roll and the curing roll.

ADAMSON UNITED COMPANY

AKRON 4, OHIO

SUBSIDIARY OF UNITED ENGINEERING & FOUNDRY COMPANY

BRANCH OFFICES IN PRINCIPAL CITIES

ROTOCURE*

VULCANIZATION

changes in 1/10th the time!

One piece housings provide adequate "window" clearance for removal of the curing roll. A special "C"-Hook is furnished for supporting the roll as illustrated. All design details have been engineered to facilitate and speed roll changing. For example, all supply and return lines are quick-disconnect type. The heating shoes surrounding the Vulcanizing roll are automatically retractable.

Some desirable features:

- **All rolls are supported in self-aligning roller bearings, oil flood lubricated.**
- **Speed range is adjustable from ½ to 6.2 feet per minute.**
- **Vulcanizing roll is 60" diameter; 80" face.**
- **Tension roll is hydraulically actuated; maximum belt tension, 240,000 pounds.**

●

Easy replacement of the steel band is made possible by the ingenious arrangement illustrated. After the curing roll has been removed, the specially provided "A-Frame" is bolted in place and jacked up far enough to remove the weight from the base rail on the near side. The two "foot blocks" are then taken out, permitting the belt to be removed through the resulting opening.

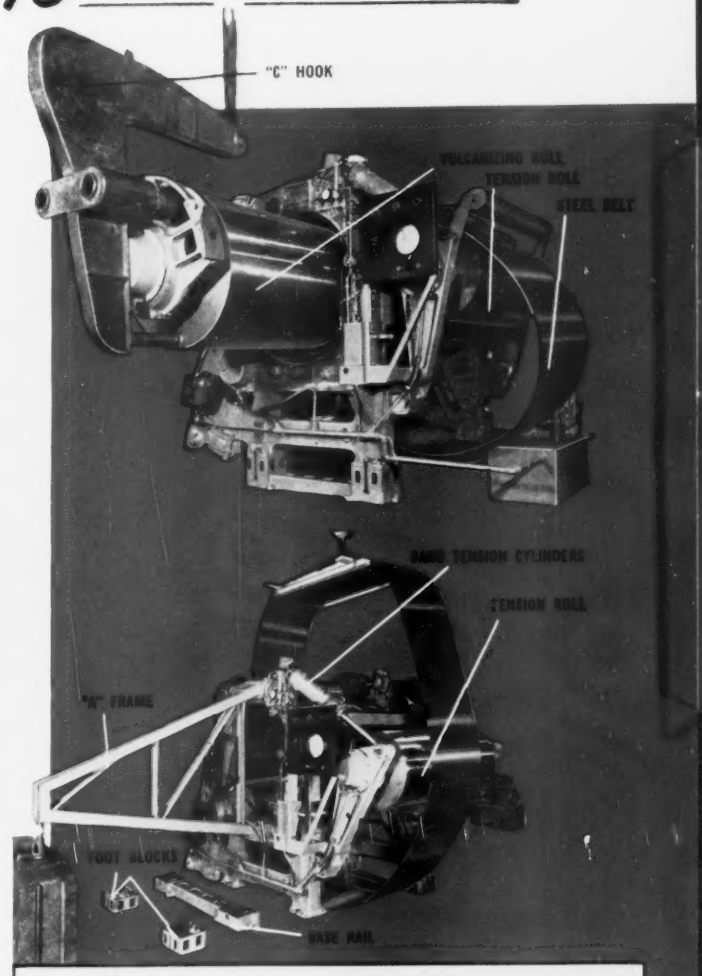
●

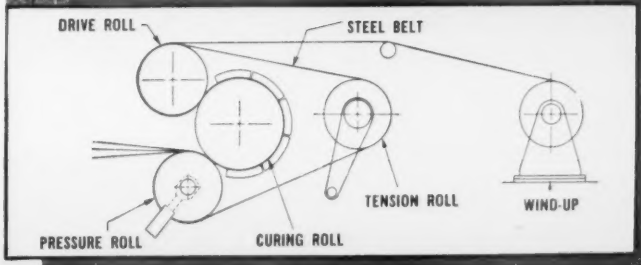
Operation of the Rotocure is shown schematically at right. The Rotocure has many advantages over the conventional press on large production runs. For example:

- **Increased production provided by continuous operation, which eliminates opening, cooling, reheating and closing.**
- **Elimination of overcuring and undercuring of the over-lap areas occurring on conventional presses.**
- **Greater uniformity of stretch.**

Our engineers are available for consultation concerning the possibilities of the Rotocure for your particular products.

**The Rotocure machine is a patented development of Boston Woven Hose and Rubber Company built by Adamson United Company under a licensing arrangement.*





As defense production has been stepped up, the demand for Barrett* chemicals has grown tremendously.

Among the Barrett products eagerly sought is phthalic anhydride, vital to the production of alkyd resins, phthalate ester plasticizers, and many other important materials.

To meet this great demand, Barrett has taken two decisive steps that will substantially raise the output of phthalic anhydride.

First, the capacities of Barrett's Philadelphia and Ironton plants already have been increased. Second, Barrett is well under way in its plans to build two new plants in Chicago and Philadelphia. The one in Philadelphia alone will increase the production of phthalic anhydride by 36,000,000 pounds each year!

For defense and for civilian production . . . Barrett is expanding to help keep America strong!

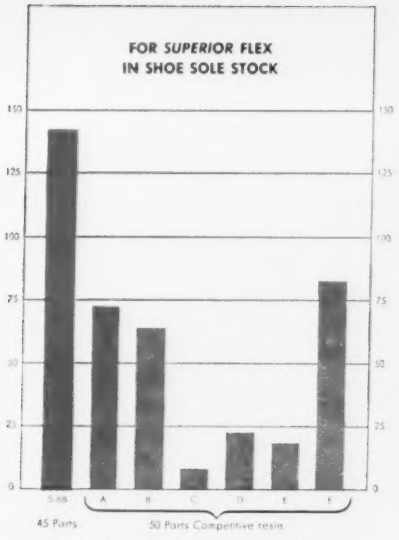
* Reg. U. S. Pat. Off.

Barrett

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

LEADING MANUFACTURERS COUNT ON BARRETT AS THE LARGEST PRODUCER OF PHTHALIC ANHYDRIDE

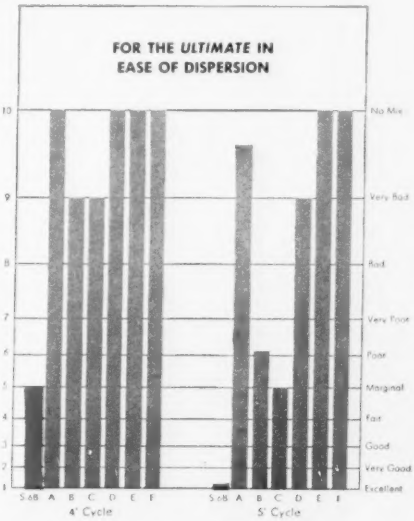
known as the best



Ross Flex of PLIOLITE S-6B vs. competitive resins in shoe sole stock; thousands of flexes/0.1" cut growth

PLIOLITE S-6B

USE PROVED Products



Dispersion rating of PLIOLITE S-6B vs. competitive resins in a gum formulation 50/100 resin/rubber

Here are two reasons why PLIOLITE S-6B is "The Best Known — Known as the Best" reinforcing resin on the market. Shoe soles reinforced with PLIOLITE S-6B are known to have superior flex. And whatever the product PLIOLITE S-6B is easier to disperse — even under marginal mixing conditions.

Check these two graphs—prove to yourself—then talk over your reinforcing problem with your Goodyear Chemical Division representative, or write today to:

Goodyear, Chemical Division, Akron 16, Ohio

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

They last twice as long... vinyl products stabilized with "Dutch Boy" DYPHOS

Two thousand hours *plus* in the Weatherometer without failure . . . that's the record of "Dutch Boy" Dyphos stabilized vinyl compounds.

In plastisols, as well as organosols and emulsion dispersions, Dyphos gives you opaque vinyl products — unequalled in light- and heat-stability — excellent in color retention and long-lasting flexibility

Dyphos gives you these advantages in vinyl moldings and extrusions, too.

Recommended also for systems using chloro-paraffins as secondary plasticizers, Dyphos is a general purpose stabilizer. You can rely on Dyphos to give your vinyl compounds the qualities needed for standout performance in service.

Let us show you how "Dutch Boy" Dyphos can simplify your operations...double the life of your vinyl formulations. Also investigate the other "Dutch Boy" chemicals. Just write for factual data and technical assistance.

"Dutch Boy" Stabilizers

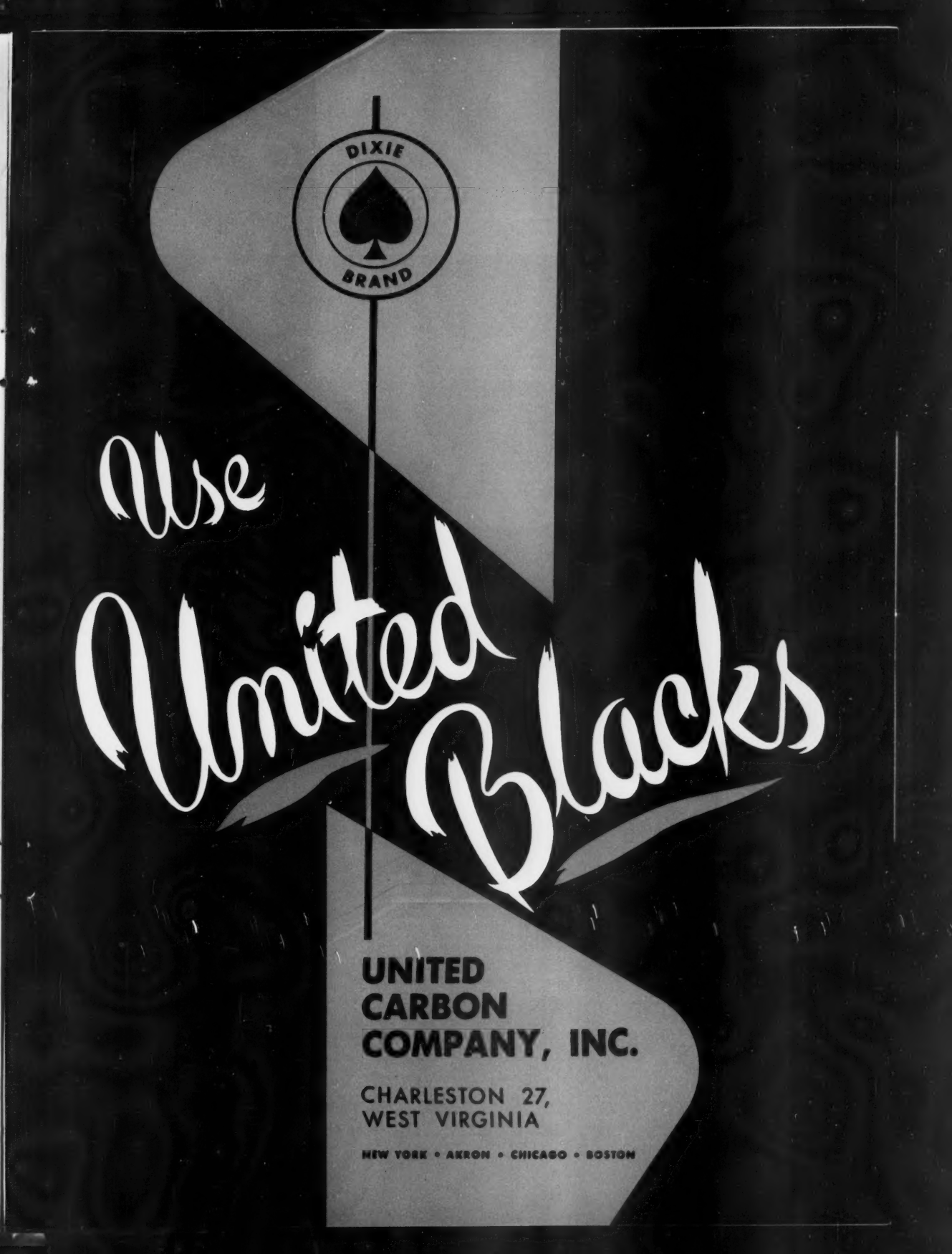
PRODUCT	USE
TRIBASE (Tribasic Lead Sulphate)	Electrical and other compounds requiring high heat stability
TRIBASE E (Basic Lead Silicate Sulphate Complex)	Low volume cost insulation
DS 207 (Dibasic Lead Stearate)	Stabilizer-lubricant for sheeting, film, extrusion and molded compounds
PLUMB-O-SIL A (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored sheeting and upholstery stocks
PLUMB-O-SIL B (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored film, sheeting, belting
PLUMB-O-SIL C (Co-precipitate of Lead Orthosilicate and Silica Gel)	Highly translucent film and sheeting
DYTHAL (Di-basic Lead Phthalate)	General purpose stabilizer for heat and light. Good electrical properties
DYPHOS (Di-basic Lead Phosphite)	Outstanding for heat and light in all opaque stocks, including plastisols and organosols
NORMASAL (Normal Lead Salicylate)	As stabilizer or co-stabilizer in vinyl flooring and other compounds requiring good light stability
BARINAC (Barium Ricinoleate)	Stabilizer-lubricant for clears

Dutch Boy* CHEMICALS

*Reg. U. S. Pat. Off.

NATIONAL LEAD COMPANY

111 Broadway, New York 6, N. Y.


DIXIE
BRAND
Use
United Blacks
UNITED
CARBON
COMPANY, INC.
CHARLESTON 27,
WEST VIRGINIA
NEW YORK • AKRON • CHICAGO • BOSTON

DIXIE 40

balances your

REQUIREMENTS

WITH ALL THESE ADVANTAGES

Low Compounding Cost	**High Reinforcement**
Wide Flexibility	**Low Heat Build-Up**
Cool Mixing	**High Resiliency**
Easy Processing	**Good Aging**
Rapid Extrusion	**Minimum Flex Cracking**
Fast Rate of Cure	**Minimum Cut Growth**

Standardize on DIXIE 40 — a high modulus furnace black (HMF) for good economy, outstanding performance and all-around satisfaction.

UNITED CARBON CO., INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

CANADA: CANADIAN INDUSTRIES, LTD.

Retard flex cracking and oxidation

Whether your products are made of natural, synthetic or reclaimed rubber, you can retard oxidation and flex cracking by the use of Monsanto Antioxidants. These proved-in-service chemicals are available for immediate delivery.

Santoflex* **B, Santoflex BX** and **Santoflex 35** retard flex cracking and oxidation.

Santowhite* **Crystals, Santowhite MK** and **Santowhite L** are nonstaining antioxidants for light-colored products.

Flectol* **H** retards oxidation and heat deterioration in compounds that do not require exceptional resistance to flex cracking.

Antioxidants are among some two score chemicals Monsanto produces especially for the Rubber Industry. For information on chemicals for rubber, get in touch with MONSANTO CHEMICAL COMPANY, Rubber Chemicals Sales, 920 Brown St., Akron 11, Ohio.

Reg. U. S. Pat. Off.

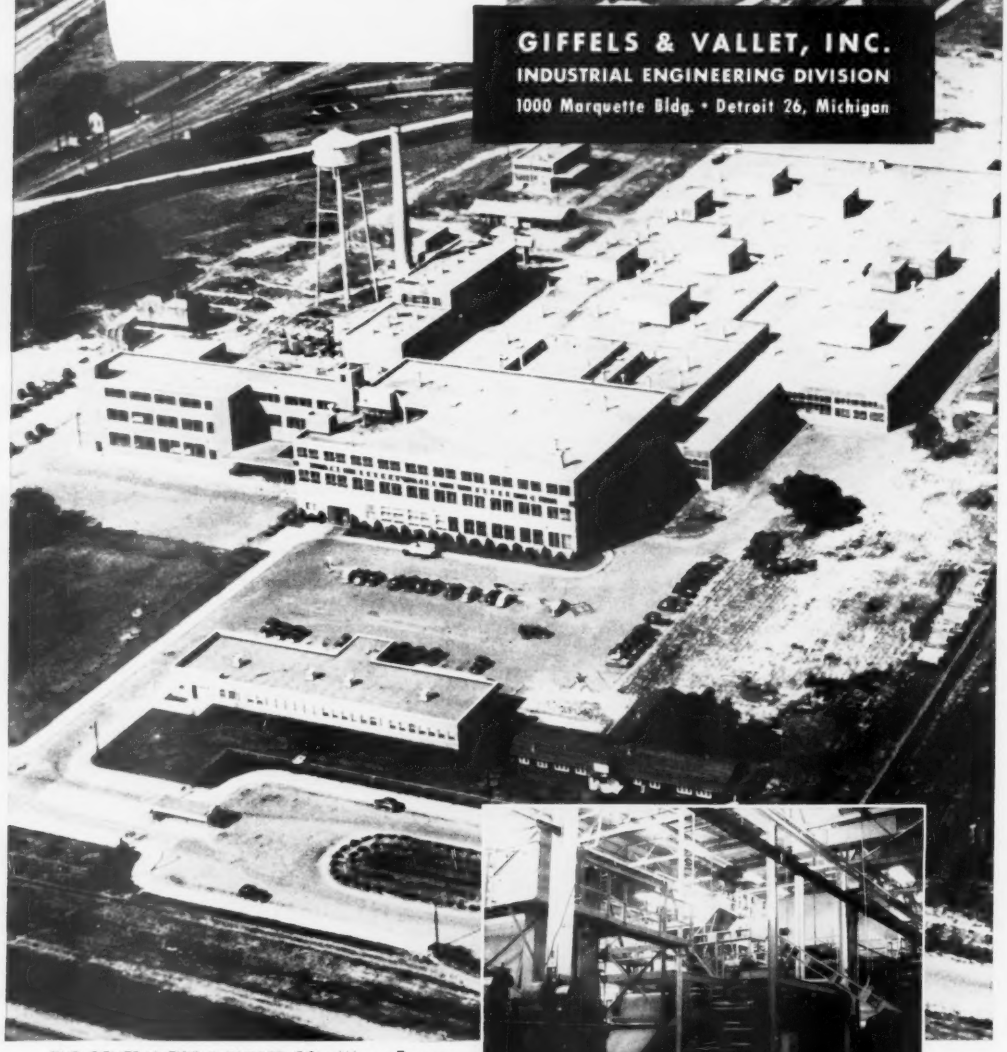
ANTIOXIDANTS

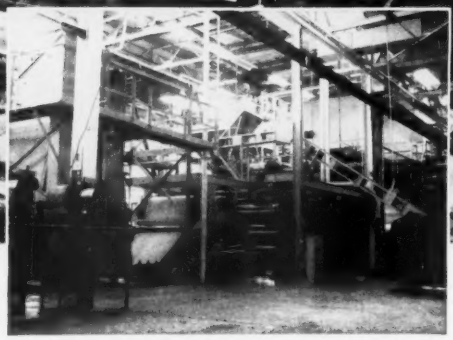
MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

SEE
WHAT *They* SAY
ABOUT
Giffels & Vallet

GIFFELS & VALLET, INC.
INDUSTRIAL ENGINEERING DIVISION
1000 Marquette Bldg. • Detroit 26, Michigan





THE GENERAL TIRE & RUBBER CO. • Waco, Texas

Schrader Tire Valve Caps are designed with the metal outer shell and the specially compounded rubber sealing unit *doubly* reinforced with non-collapsible metal plates. Schrader Valve Caps are *guaranteed* air-tight up to 250 lbs. You can be sure any vehicle, any tire, equipped with Schrader Tire Valves, sealed with these *quality Schrader Caps*, has positive protection at this vital point.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.

Division of Scovill Manufacturing Company, Incorporated

Tires that ride to work and play

Load the family in the car. Head for the beach, the country, or town or church . . . with never a fear about the tires. They're built to give protection for many miles of easy, economical driving. A key to dependable tire performance is the valve that *locks* the air in the tire.

Schrader

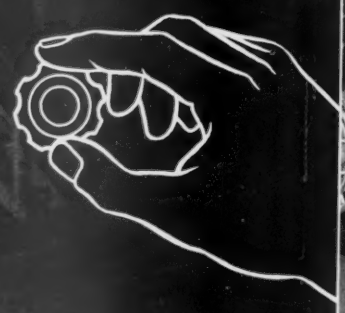
REG. U. S. PAT. OFF.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

10,000 Pounds Constant Tension

under fingertip control...



... in this

IOI Nylon Tire Fabric Latexer

Complete one-man process control is but one of the many outstanding advanced-design features of this IOI latexing machine. Here are just a few of the others:

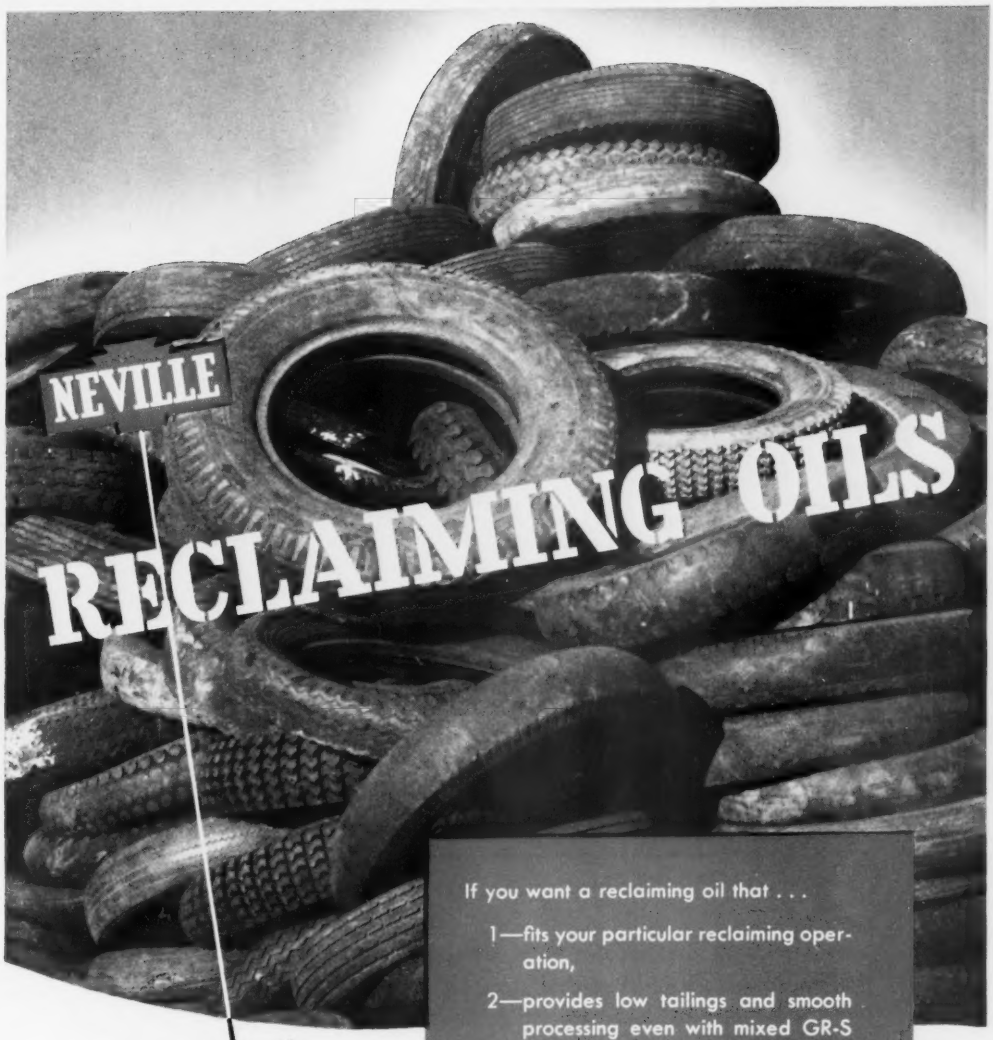
- Simultaneous impregnation, drying and attenuation of the cords, resulting in pre-stretched tire fabric that requires no further processing prior to calendering.
- Direct gas-fired heating, under complete control, provides the correct high temperature required for the most efficient rate of drying either woven or weftless fabric.
- Rugged in construction, yet extremely flexible in operation, with constant-tension control at all speeds.
- Units available in various capacities, from small production machines up to high speed calender train installations.
- These machines require very little cleaning and a minimum of housekeeping maintenance.

An Industrial Ovens engineer will be glad to call at your convenience to discuss the application of this machine to your particular latexing requirements.

INDUSTRIAL OVENS, INC.

IOI ENGINEERING VERSATILITY

13825 TRISKETT ROAD CLEVELAND 11, OHIO



LX-572
LX-777
X-1

If you want a reclaiming oil that . . .

1—fits your particular reclaiming operation,

2—provides low tailings and smooth processing even with mixed GR-S and natural stock,

3—gives controlled tack and improved tensile . . .

then you'll want to investigate the Neville line of Reclaiming Oils.

THE NEVILLE COMPANY
PITTSBURGH 25, PA.
Plants at Neville Island, Pa., and Anaheim, Cal.

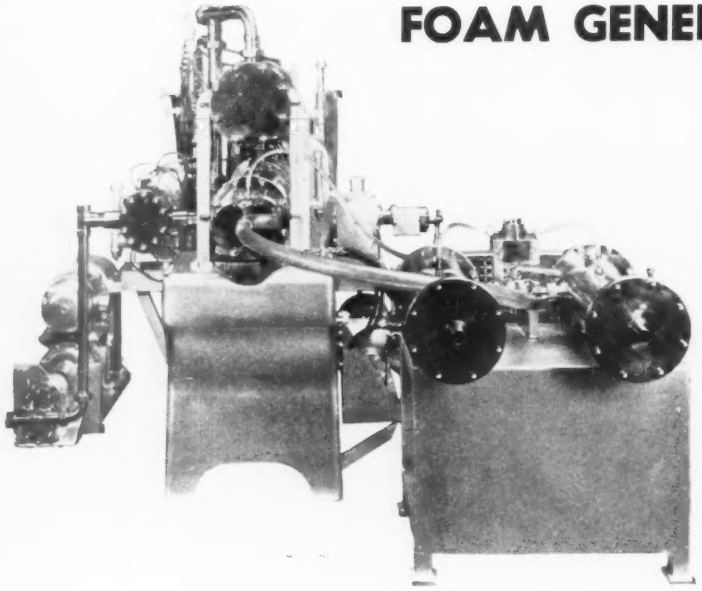
• ***Write for information***

Chemicals for the Rubber Industry

R 46

the FLOW-MASTER *continuous*

FOAM GENERATOR



Equipped with dual blender for continuous operation. Graduated Burrettes for checking metering accuracy of gelling agents, added accelerator, etc.

Self contained unit, requires no accessories or air pumps, ready to install to your water and electric current.

Will produce continuously Foam Rubber of desired density with uniform cell structure from Natural, GRS, Neoprene Latex, or combinations, suitable for slab, or molded goods, pillows, mattresses, rug backing, carpet underlay, etc.

Low production costs.

THE MARCO COMPANY, INC.

MANUFACTURERS — INDUSTRIAL DESIGNERS — RESEARCH LABORATORIES

3rd & Church Street

WILMINGTON, DELAWARE

outstanding

for dependable quality and uniformity

PICCO

SOLVENTS AND SOLVENT OILS

Hi-Solv Aromatic Petroleum Naphthas
PICCO Coal Tar Naphthas
Hi-Solv Heavy Naphthas
PICCO Coal Tar Heavy Naphthas
Hi-Solv Solvent Oils · PICCO Heavy Oils

Write for factual bulletin describing Picco Solvents and Solvent Oils. We will gladly send samples. Specify application, so we can furnish suitable grade.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.
Clairton, Pennsylvania
Plants at CLAIRTON, PA.; WEST ELIZABETH, PA.; and CHESTER, PA.
Representatives in Principal Cities

FOUND

TY·PLY

an honest Rubber-to-Metal Adhesive

TY-PLY **Q** for bonding Natural, GR-S, and Butyl

TY-PLY **S** for bonding Neoprene

TY-PLY **BN** for bonding N-types

TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface.

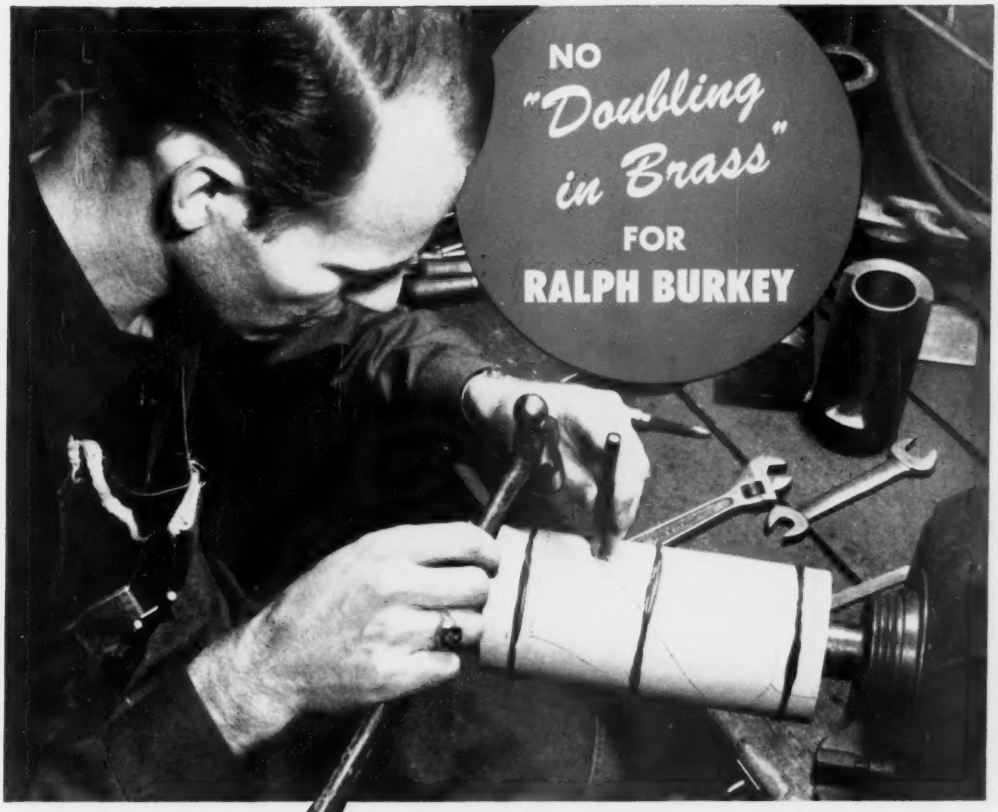
Marbon

MARBON CORP.

GARY, INDIANA

SUBSIDIARY OF BORG-WARNER

TY-PLY has stood the test of time....since'39



It takes special skills to make a really good tire mold. A man who works on tire molds one day, on something else the next, just can't approach the skill and proficiency of one who devotes his whole time to making tire molds.

That's why our Athens Machine Division turns out consistently better tire molds — for in Athens, plant management and plant personnel, like Ralph Burkey, can devote themselves entirely to one job: making better tire molds.

Our Athens Machine Division is a completely self-contained tire mold manufacturing plant, equipped with machines specially designed for tire mold manufacture, staffed with personnel highly trained in every step of mold making.

ATHENS MACHINE DIVISION

THE BRIDGWATER MACHINE COMPANY

Akron, Ohio

FOR BETTER MOLDS FOR BETTER TIRES *SPECIFY* BRIDGWATER

NEW!

SUBLAC PX-5 (Powdered Resin)

eliminates use of zinc oxide and accelerators in GR-S and natural rubber sole stocks!

- eliminates need for zinc oxide and accelerators in using basic fillers (Silene, etc.)
- oil resistant, light colored
- reaches optimum cure in 10 min. at 325° F.

TYPICAL TEST FORMULATIONS

	Formula #83	Formula #84
GRS (X631)	100	100
Sulphur	3	3
Silene EF	75	75
Neozone D	1	1
SUBLAC PX-5	30	30
Polymel C-130 Resin		5

NOTE—no zinc oxide or accelerators in these compounds

...AND TEST RESULTS

10 Min. Cure at 325° F.

Tensile psi	1200	1200
Elongation %	250	280
Modulus @ 200%	990	850
Hardness	81	83

ALSO PREVENTS SCORCH IN NEOPRENE!

10 parts of Sublac PX-5 on the rubber acts as a co-accelerator in all non-black neoprene stocks and prevents scorch in both process and bin storage stocks.

Sublac PX-5 also gives a preservative quality to unvulcanized neoprene stocks.

TEST SUBLAC PX-5 YOURSELF, FREE!

Write today for 5 lb. sample and test data. Once you've tried Sublac PX-5 in your own stock, you'll agree it's the biggest development yet in modern rubber processing.

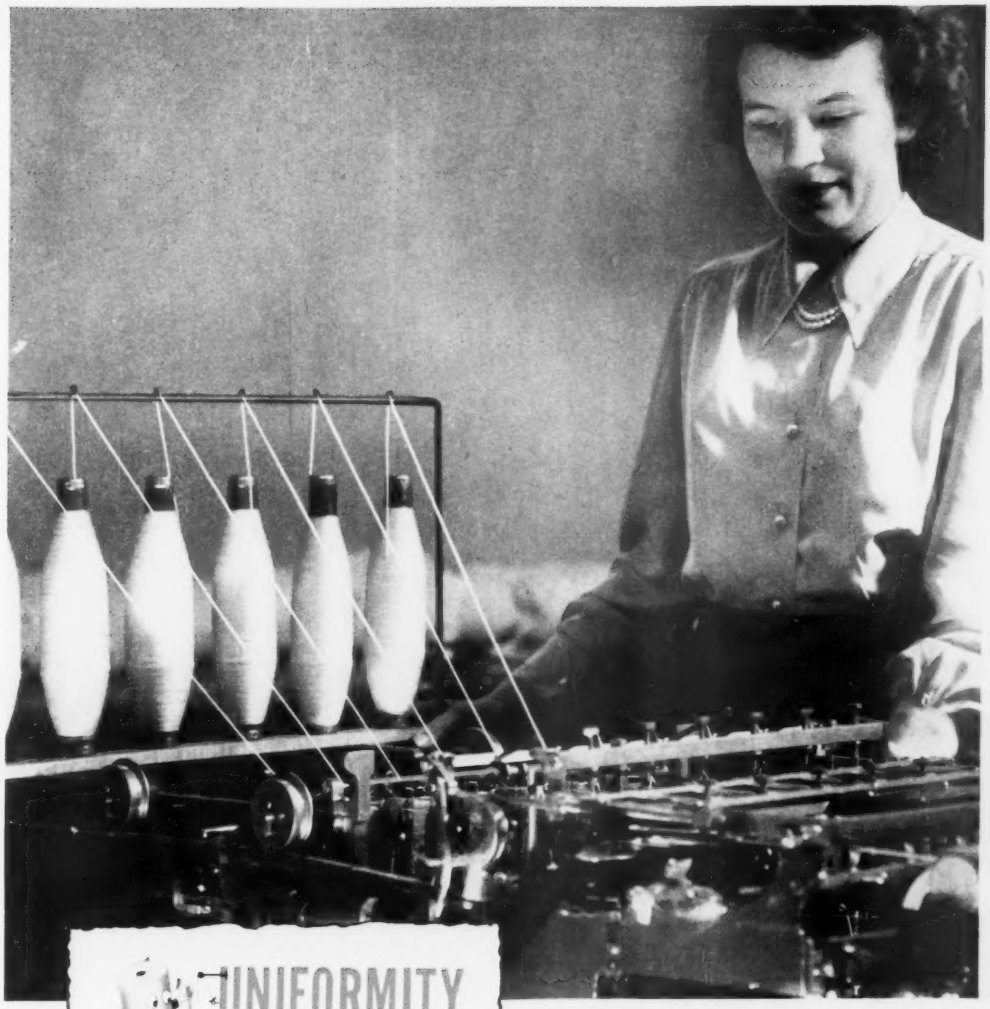
REPRESENTATIVES:
EASTERN: H. M. ROYAL, INC., TRENTON, N. J.
WESTERN: MERIT-WESTERN CO., LOS ANGELES, CALIF.

ALSO ASK ABOUT THESE QUALITY POLYMEL PRODUCTS:

GILSOWAX (solid)—Extender, Wire Compounds
SUBLAC RESINS (powders)—Hardeners, Stiffeners
POLYMEL 6 (solid)—Tires, Camelback
POLYMEL 7 (liquid)—Tires, Camelback, Carcass
POLYMEL D (solid)—Polystyrene-Indene Plasticizer
POLYMEL C-130 (solid)—Plasticizer
D-TAC (solid)—Non-coloring Detackifier

THE POLYMEL CORP.

1800 Bayard Street
Baltimore 30, Maryland
Phone PLaza 1240



UNIFORMITY
Makes the Big Difference
In INDUSTRIAL Fabrics

MT. VERNON FABRICS Give You Greater Fabric Uniformity

Shown above is one of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. The unit shown automatically tests 6 strands of yarn at one time.

Mt. Vernon-Woodberry Mills

Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles

TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST — NEW YORK

beauty treatment by TITANOX pigments

From baby's bathinette to big sister's boots, rubber and plastic products get a real "face lifting" from Titanox titanium dioxide pigments. Whiter whites and brighter tints make your product better looking than ever, more appealing to today's color-conscious buyers.

Yet, for all their value, Titanox beauty treatments are easy on your production costs. Titanox pigments' fine particle size makes them readily dispersible in both rubber and plastic compositions, regardless of the equipment you use. They are physically and chemically stable, uninfluenced either by the heat or the ingredients used in compounding elastomers or plastics. In short, Titanox pigments are highly compatible with both.

There's a rutile or anatase type Titanox pigment for any of your requirements, for low or heavy loadings, for any degree of whiteness or opacity, for indoor or outdoor end use. Just check with our Technical Service Department—they'll be glad to help you. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

® TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

pound for pound . . .

CRYSTEX

contains more Insoluble Sulphur

● Prove it to yourself by analyzing equal units of CRYSTEX and any other product. You'll find that CRYSTEX is at least 85% insoluble in Carbon Bisulphide, topping the field in this respect. This high insoluble sulphur content actually makes CRYSTEX more economical and many users find that it helps produce a better product.

Why not consult us about the possible use of CRYSTEX Insoluble Sulphur to improve your products or decrease their cost?

Other Stauffer Rubbermakers' Chemicals

- Commercial Rubbermakers' Sulphur Tire Brand, 99½% Pure
- Refined Rubbermakers' Sulphur, Tube Brand
- "Conditioned" Rubbermakers' Sulphur
- Carbon Tetrachloride
- Carbon Bisulphide
- Caustic Soda • Sulphur Chloride • Borax
- Flowers of Sulphur, 99½% Pure 30% Insoluble in CS_2)

Stauffer CHEMICAL COMPANY SINCE 1881

STAUFFER CHEMICAL COMPANY
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

221 N. LaSalle St., Chicago 1, Ill. • 824 Wilshire Blvd., Los Angeles 14, Cal.
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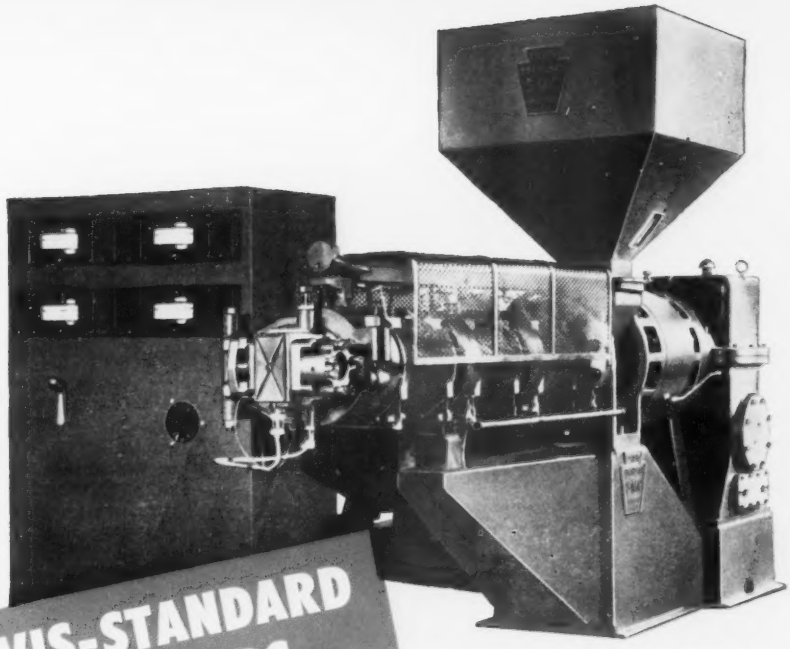
There's an easier way
to separate SHEET or SLAB stock
and lots healthier, too!
"AQUAZINC" IS YOUR ANSWER!
Using elephants to pull sheeted stock apart would be novel — but using Aquazinc to *keep* it apart is lots smarter! Highly concentrated zinc stearate solution — Aquazinc is applied as a spray or dip — eliminating the health and explosion hazards of dusting — the need for liners or cushions. Developed especially for sheet-mill or slabbed stock, Aquazinc lubricates too, giving you a smooth-flowing stock plus perfect tack control. It is readily absorbed, without affecting the stock — leaves a glossy, non-greasy finish that adds appearance-appeal. Let us send a sample of Aquazinc to try in your own plant.
BEACON
QUALITY-UNIFORMITY-DEPENDABILITY
Chemical Industries, Inc.
BOSTON 30, MASSACHUSETTS



Davis-Standard 6"
Thermoplastic Extruder

DAVIS-STANDARD EXTRUDERS

...ENGINEERED TO YOUR OPERATING NEEDS

Every feature of our extruders for rubber or plastics is the result of long experience in the extrusion industries and intimate knowledge of production problems.

Davis-Standard "Stream-Flo" insulating heads permit the most efficient operating velocities. All head equipment is compact, accessible and easy to clean. For thermoplastic applications, sectional-type cast steel cylinders afford precise temperature control as well as maintenance advantages. Each section has wear and corrosion-resistant liners.

Another exclusive feature of Davis-Standard plastic extruders is the "Therma-Fin"* heating jacket, with range-type tubular heating elements and stainless steel cooling coils cast into aluminum cooling fins.

*Patent Pending

With this construction any desired temperature condition may be obtained.

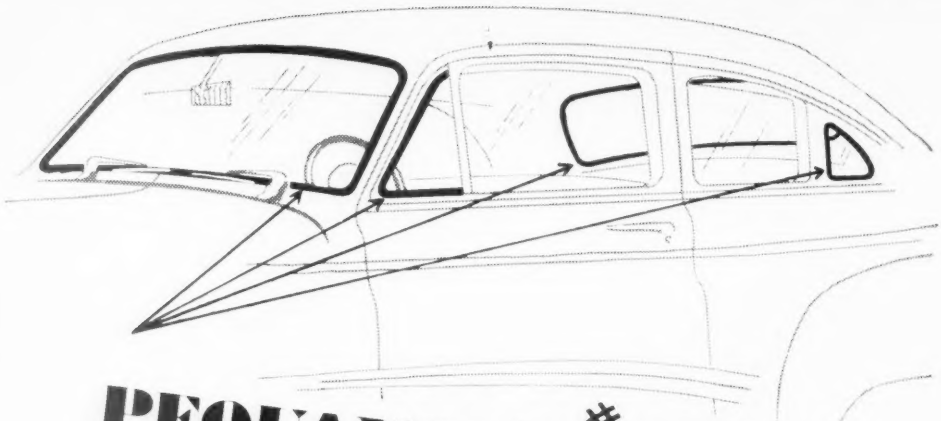
Feed section is a separate casting. Stock screws are of special steel alloy, normally bored for water cooling. Variations for depth and lead are available for different compounds. Drive is V-belt or flexible coupling to enclosed worm reduction gear. Davis-Standard machines are furnished complete, including control panel, ready for installation.

Our engineers will welcome the opportunity to work with your engineers on your problems. Our extensive experience in custom-built equipment will fit the installation to your exact requirements.

THE STANDARD MACHINERY COMPANY

MOLDING PRESSES AND EXTRUSION MACHINES
WORLD'S LARGEST MANUFACTURERS OF CUSTOM-BUILT EXTRUSION MACHINES
18 WATER STREET, MYSTIC, CONNECTICUT
Export Office: Ballagh & Thrall, Independence Square, Philadelphia 6, Pa.

Butyl Reclaim Is NOT *Under Allocation*



PEQUANOC'S #5950
Butyl Reclaim

for use in **GR-I**
compounds
where ozone resistance
is important-

In your GR-I compounds use Pequanoc's 5950 butyl reclaim for better ozone resistance. Pequanoc butyl reclaims are *not* under allocation. A typical formula follows:

OZONE RESISTANT PEQUANOC COMPOUND A-174-4

GR-I	30.20
5950 Butyl reclaim	39.80
Stearic Acid	.35
Zinc Oxide	2.60
Dutrex #6	2.75
Sulfur	1.05
2 MBT	.27
Tetramethylthiuram disulfide	.53
Tellurium diethyl dithio carbamate	.18
HMF black	22.27
	100.00

Tensile	1500# psi Min.
Elongation	350% Min.
Lb. Cost	$.1610
Specific Gravity	1.21
Volume Cost	$.1948

Extrusion compound for R615a Channel Rubber, etc. ASTM D 735-51T.

Pequanoc Rubber Co.
MANUFACTURERS OF RECLAIMED RUBBER
MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

strong, clean, chemically stable

CALCO BENZIDINE TONERS

Benzidine Yellow Toner 45-2555

Benzidine Orange Toner 45-2850

The Benzidine Yellows are strong, clean and chemically stable organic toners suitable for a wide variety of products. They are quite light-fast, non-migrating, non-darkening and stable to acids, alkalis and sulfurous chemicals.

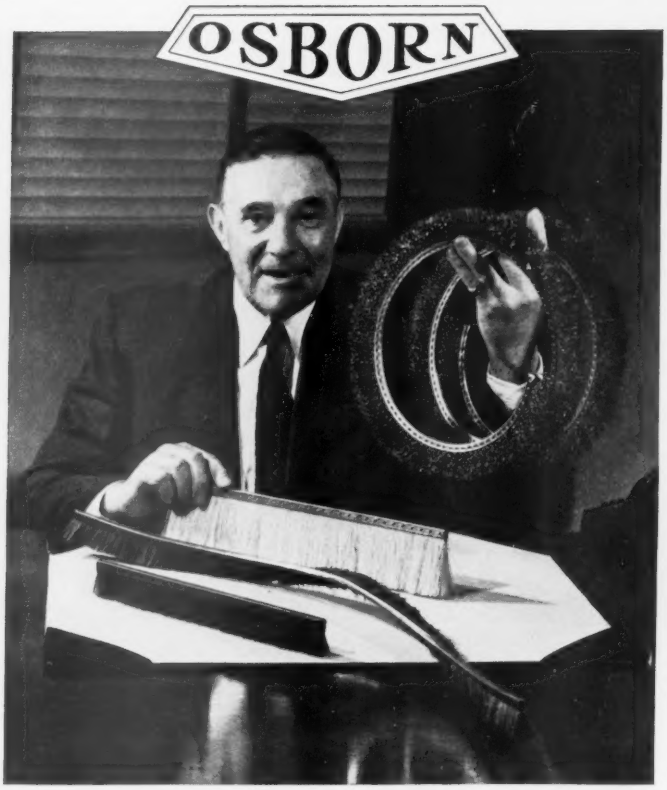
A wide gamut of colors, ranging from a light lemon yellow to a rich clean orange can be obtained by using Benzidine Yellow and Benzidine Orange Toners. These colors impart strong sales appeal to bathing caps, balloons, toys and miscellaneous druggists' sundries.

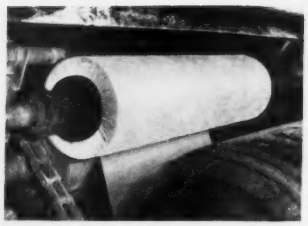
Consult your Calco representative for full information about this and other pigments and rubber chemicals in the *complete* Calco line.

Calco®

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION
PIGMENT DEPARTMENT
BOUND BROOK, NEW JERSEY
Branches and Warehouses in Principal Cities





SCRUBS STEEL. Master Strip wound helically around a steel core becomes an Osborn Heli-Master® Brush. Here it scrubs strip steel preparatory to electrolytic tinning. In this mill, six of these Heli-Master Brushes clean the strip at 1500 feet per minute, working around the clock.

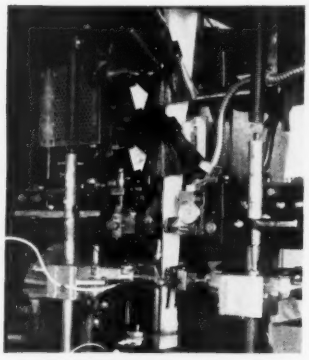
PREPARES GLASS. Here Heli-Master brushes clean glass and apply a uniform film of binder for silvering compound. Replace hand operation. Steps up mirror production and cuts rejects.

Heard about these ways to find manpower?

And cut costs! Every manufacturer should know about this brush . . . the Osborn Master® Strip. In its more than a thousand forms, shapes and sizes, this power brush . . . at the push of a button . . . is doing jobs formerly requiring many skilled hands. It is boosting output, improving product quality and slashing costs.

Master Strip can be used in special mountings—straight, curved or coiled in a helix. Its fill material can be wire, hair, fibre, textiles or synthetics in trim lengths from 1 to 10 inches. It comes in any length up to 120 inches. Name your problem—cleaning, scrubbing, finishing or many others. It can be matched to *your* job!

The nearby **O**sborn **B**rushing **A**nalyst will gladly study *your* manufacturing operations and explain how you can benefit with this versatile tool! Call today or write *The Osborn Manufacturing Company, Dept. 627, 5401 Hamilton Avenue,* Cleveland 14, Ohio.



KILLS STATIC. These brass wire Strip Brushes are used in a tea-bagging machine to remove static from the bag paper. Speeds filling and sealing of bags.

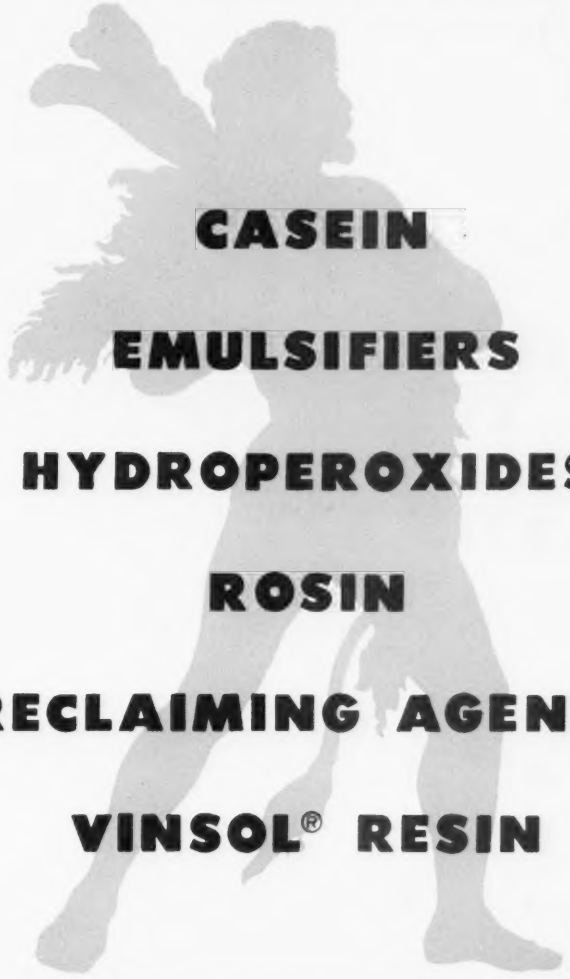
WHAT'S YOUR PROBLEM?
The **O**sborn **B**rushing **A**nalyst nearby will gladly help. Call him today!

Osborn Brushes®

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

HERCULES

Chemical Materials for the Rubber Industry



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EMULSIFIERS

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RECLAIMING AGENTS

VINSOL® RESIN

HERCULES POWDER COMPANY

INCORPORATED

918 Market Street, Wilmington, Delaware

Experiments sometimes cause trouble...

Skellysolve for Rubber and Related Industries

Applications

SKELLYSOLVE B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound.

SKELLYSOLVE C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve B.

SKELLYSOLVE D. For cements and variety of manufacturing operations. Good odor. Quick drying. Minimum of heavy, greasy compounds.

SKELLYSOLVE H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve D is desired.

SKELLYSOLVE E. For use wherever a relatively slow drying solvent is desired.

SKELLYSOLVE R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency.

"DOC" MacGEE SAYS: Why risk unnecessary experiments by trying out something "just as good as" Skellysolve. You take no chances with the quality of your product or of balling up your plant operations when you standardize on Skellysolve—a fact that's been proved over and over again for more than 20 years.

First of all, Skellysolve is noted for its uniformity. Every batch has the same over-all properties to protect your *product's* high quality . . . to fortify its sales appeal, as well as to give trouble-free operations in your plant. Skellysolve's uniformity is assured by strict laboratory controls, unsurpassed manufacturing methods, and the "will to do" that stems from pioneering and major product operations. Skellysolve is not a "side-line" venture.

Test Skellysolve for every feature that is important to you. Check its low end point, quick evaporation, low vapor pressure, its minimum of unsaturates and pyrogenic decomposition products.

See why Skellysolve's minimum of low and high boiling compounds means reduced rejects due to blushing and blisters. Note the controlled vapor pressure to guard against bloated containers. What's more, the minimum of low boiling compounds means no "seeds" in rubber cements . . . with high bonding strength assured by freedom from greasy residues.

For more complete technical facts, write now. And ask about special help on solvent applications from the Skellysolve Technical Fieldman.

SKELLY

Skellysolve

SOLVENTS DIVISION, SKELLY OIL COMPANY
KANSAS CITY, MISSOURI

a new word for the Rubber Industry

Calco NOBS* No. 1

The *outstanding* delayed-action accelerator for natural, synthetic, and reclaimed rubbers.

Ideal for use with reinforcing furnace blacks in up-to-date tire-compounding.

No special handling required.

NOBS No. 1 is the last word in delayed-action accelerators. Convince yourself. Request samples and information for evaluation purposes from our sales representatives listed below.

*Trade-mark

Calco®

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION
INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT
BOUND BROOK NEW JERSEY

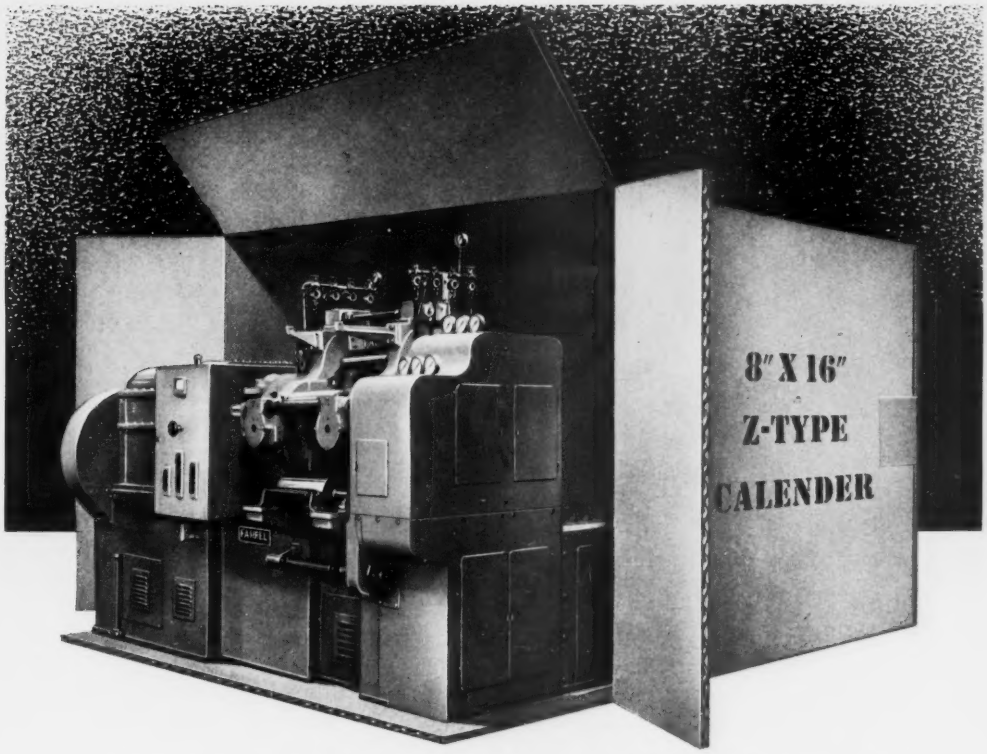
SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal Inc. Los Angeles, Calif. H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd. Montreal and Toronto

a new word
for the Rubber Industry

Calco NOBS* No. 1

*Trade-mark

SEE REVERSE SIDE



HERE IS MAXIMUM CALENDER VERSATILITY IN A SINGLE PACKAGE

This 8" x 16" four-roll Z-type calender is probably the most highly versatile experimental machine of this type ever built. The drive arrangement permits flexibility in roll speeds and ratios for experimentation in single and double coating, sheeting, and running unsupported plastic film of very light gauges.

The drive motor furnishes adjustable speed for the four calender rolls, and a unique arrangement of gears and clutches provides variables in roll speeds one to another. This means that, by a simple movement of clutch levers, the rolls may be set at related speeds determined in advance to be most advantageous for the work to be done.

The rolls are bored and equipped with rotary joints for the circulation of temperature-controlling fluid. Gauge adjustment of all but the fixed lower roll is by hand ratchet. The use of clutches on the top roll and bottom side roll permits independent movement of roll ends or the simultaneous adjustment of both ends of either roll. In this manner roll openings can be set precisely for the most accurate production to gauge.

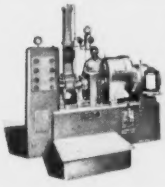
This unique calender is an example of the made-to-order laboratory equipment—calenders, Banburys, mills, extruders, refiners, etc.—which you can obtain from Farrel-Birmingham. Send for information on machines to meet your specific needs.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

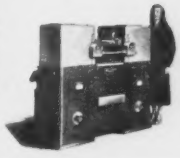
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham®

FB-730



This size B Banbury mixer, with a capacity of two pounds of crude natural rubber or gravity of batch times 2, can be conveniently and economically used in making trial batches. It is driven by a four-speed motor and is equipped with an exceptionally large air cylinder for forcing stock into the mixing chamber.



The two rolls of this 6" x 13" self-contained laboratory mill are individually driven, providing a considerable range of operating speeds and friction ratios. Speed range of the back roll is 3 to 48.9 RPM and the front roll from 4.6 to 36.8 RPM. The mill has tiltable guides, scrapers, knee-operated safety trip and cascade lubrication.

applications of

VELSICOL RESINS

FOR RUBBER COMPOUNDING

GE-9—AB11-4—AB11-2

some suggested applications:

MECHANICAL GOODS
ELECTRICAL INSULATION COMPOUNDS
RUBBER SHOE SOLES AND HEELS
RUBBER FLOOR TILING
GASKETS AND JAR RINGS
RUBBER ADHESIVES AND CEMENTS
MOLDED RUBBER PRODUCTS
TUBULAR COMPOUNDS
RECLAIMED RUBBER
SHEETING
COLORED RUBBER STOCKS
BATTERY CASES
HARD RUBBER COMPOUNDS

features:

1. THERMOPLASTIC HYDROCARBON RESINS.
2. COMPATIBLE WITH NATURAL AND SYNTHETIC RUBBERS.
3. EFFECTIVE PLASTICIZERS AND SOFTENERS... in highly-loaded clay stocks or in recipes incorporating carbon black.
4. MILL READILY.
5. EXCELLENT DISPERSING AGENTS FOR FILLERS AND PIGMENTS.
6. FACILITATE PROCESSING PROCEDURES . . . impart excellent milling, calendering processing and tubing characteristics to stocks.
7. IMPART EXCELLENT PERFORMANCE CHARACTERISTICS . . . such as good tensile strength, elongation and modulus, as well as good resistance to abrasion and aging.
8. POSSESS HIGH ELECTRICAL RESISTANCE PROPERTIES.
9. AID IN THE DEVELOPMENT OF NON-SCORCHY STOCKS... without excessive retardation of cure at high temperatures.

For additional information concerning properties and applications of Velsicol Resins, write:

VELSICOL CORPORATION

GENERAL OFFICES AND LABORATORIES
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CHICAGO 11, ILL.

offices in principal cities

EXPORT DIVISION
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save money increase quality in your RUBBER COMPOUNDING with

CALCENE TM®

Calcene TM enables savings to be made on delivered pound volume cost when compared with various other widely used pigments.

The ease and feasibility of using Calcene TM to replace costlier pigments—either fully or partially—warrants your prompt investigation, especially now when production economies are becoming an increasingly important factor in your business.

CALCENE TM is a specially prepared, white, coated precipitated calcium carbonate of fine particle size.

HI-SIL®

Hi-Sil is the newest of the three exclusive Columbia-Southern rubber reinforcing pigments. Hi-Sil has been used extensively in the production of non-black natural, GR-S, butyl and Neoprene compounds where an extremely high level of physical properties is required.

Improved performance in compounding and high quality result when Hi-Sil is used.

Hi-Sil is a precipitated, hydrated silicon dioxide with a specific gravity of 1.95 and an average particle size of .025 micron. Hi-Sil imparts high modulus, high tensile and tear, and extremely high abrasion resistance.

SILENE EF®

Are you looking for a white reinforcing pigment that will give you excellent physical properties? Then give first consideration to Silene EF.

Not only will you be sure of high quality in white or colored natural rubber compounds, but also in GR-S stocks.

And yet this extra quality costs you nothing more, for Silene EF is equivalent in volume cost to ordinary reinforcing pigments.

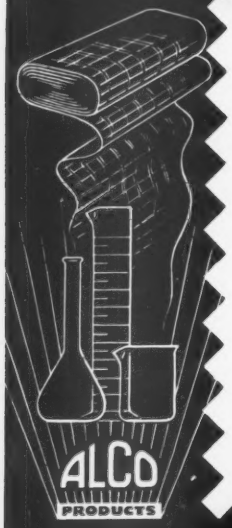
SILENE EF is a very finely divided, white, precipitated, hydrated calcium silicate.

You are invited to write for further information, free technical bulletins, or experimental working samples.

COLUMBIA-SOUTHERN
CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY

EXECUTIVE OFFICES: FIFTH AVENUE AT BELLEFIELD, PITTSBURGH 13, PENNSYLVANIA

DISTRICT OFFICES: BOSTON, CHARLOTTE, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, HOUSTON, MINNEAPOLIS, NEW ORLEANS, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS



Do You Want to Compound Your Own GR-S, Natural, Neoprene or Buna N Latices?

VULCARITES

Compounding Dispersions of Rubber Chemicals, are now available for Latex Compounding

VULCARITES are supplied as individual dispersions of zinc oxide, sulfur, antioxidants and accelerators. Composite dispersions of these chemicals are also available.

Inquiries on special dispersions formulated to your definite specifications are invited.

★ ★ ★

Samples and technical service available promptly on request.

ALCO OIL & CHEMICAL CORPORATION
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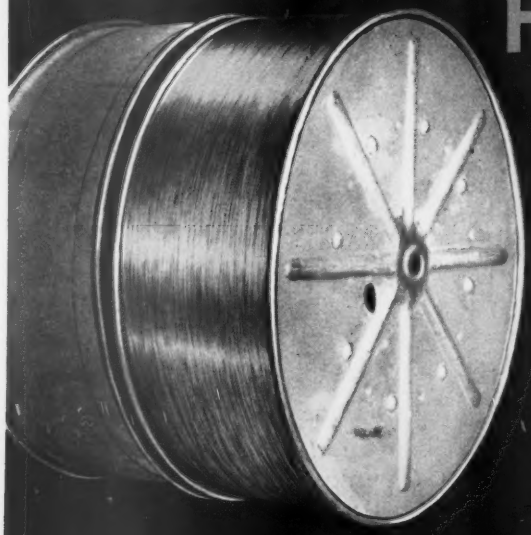

Hose REINFORCEMENT WIRE

JOHNSON special bronze plated wire, for many years the preference of major tire manufacturers — now available for vacuum and defroster hose producers, in addition to conventional liquor finish wire.

• Uniformly clean finish • Maximum adhesion to rubber • Higher elongation • Extra fatigue properties

Johnson line of specialty wires also includes oil-tempered and coldrawn brush wire—tire bead wire—steel wire for field telephones —music spring wire.

If it's steel wire— JOHNSON specialists make it better

JOHNSON
STEEL AND WIRE COMPANY, INC
Worcester 1, Mass. Akron, Ohio Los Angeles, Calif.

The Mark of SUPERIORITY

PROCESSED LINERS

THE CLEVELAND LINER & MFG. CO.

TRADE MARK

CLIMCO

REG. U.S. PAT. OFF.

CLEVELAND, OHIO, U.S.A.

For 30 years, Climco Processed Liners have maintained their unrivaled reputation throughout the rubber industry by giving outstanding service. For example:

★ **Climco Processing eliminates stock adhesions—making separation of stock and liner an easy operation. This saves labor and power.**

★ **Climco Processing lengthens the life of your liners several times, greatly reducing liner purchases.**

★ **Climco Processing protects the stock in many ways—preserves its tackiness—cuts down rejects and stock losses due to gauge distortion.**

Let us tell you the whole story on this proved product.

ILLUSTRATED LINER BOOKLET

Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

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5508 Maurice Ave. • Cleveland 27, Ohio, U.S.A.
Cable Address: "BLUELINER"
West Coast Representative:—MERIT WESTERN CO.
1248 Wholesale St., Los Angeles 21, Calif.

CLIMCO

PROCESSED LINERS

LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

SERVING THE RUBBER INDUSTRY FOR 30 YEARS

Which of these **26** *depots ensure* YOUR *supplies of*

"HORSE HEAD" ZINC PIGMENTS?

NOT JUST ONE,

but several, of these warehouses guard your requirements for the various brands of Horse Head zinc pigments — wherever you are.

Whether you need a regular L.C.L. shipment or an emergency supply between carloads, you can count on Horse Head warehouses to protect your production schedules.

This is why:

1 The Horse Head distribution system consists of an integrated nationwide network of warehouses:
- 5 on the Pacific Coast
- 10 in the Midwest
- 11 in the East and South

2 An unexpectedly heavy call on any one is promptly met by shipments from one or more of the others nearby.

Thus you get maximum delivery service:

1 Fast deliveries

2 Storage reserve in depth

3 Your choice from the most complete line of zinc pigments

THE NEW JERSEY ZINC COMPANY

Founded 1848

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

CONSISTENT DEPENDABILITY

Marbon "8000"

Look what Marbon "8000" can do for your rubber compounds

- *Versatility with natural, synthetic and reclaim rubbers.*
- *Unlimited color possibilities (non-staining)*
- *Plasticizing action at processing temperatures.*
- *Improved weather and heat resistance.*
- *Elimination of Masterbatching.*

Critical raw material supply has eased somewhat — ORDER NOW!

MARBON CORP.

GARY, INDIANA

SUBSIDIARY OF BORG-WARNER

It BLENDS as it STRENGTHENS as it IMPROVES

Production and quality control used to be at loggerheads all the time and Moe Muscles hated the lights and the liver of Inspector Mike. But that's over and done with now. Ever since Dow Corning introduced silicone mold lubricants to the rubber industry over five years ago, there has been a strange and unaccustomed peace between the pressman and the inspector.

That's because Dow Corning Silicone release agents give quick and easy release of even the most complicated parts from molds that stay clean much longer. High surface finish, uniformly sharp detail and closer tolerances come *by the drum* and non-knits, foldovers, loose tuck-unders and not-filled-out parts practically disappear.

Dow Corning Silicones Mean Business!

For more information call our nearest branch office or write for data sheet M-14

For More Production and Better Quality
SPECIFY
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DOW CORNING CORPORATION
MIDLAND MICHIGAN

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PELLETEX

Shipped the Way You Want It, When You Want It, To Every Major Rubber Center of the Nation

Pelletex, SRF standard of the carbon black industry, is sold by qualified agents, with offices and warehouses strategically located in all of the nation's rubber centers.

Carload shipments, in either bag or bulk, are made directly from General Atlas plants. Bulk shipments are made in specially designed company-owned covered hopper cars to PELLETEX consumers within the limits of the continental United States and Canada.

Overseas member of the Pelletex selling team is Cabot Carbon Limited of England.

The GENERAL ATLAS Carbon Co.

77 FRANKLIN ST., BOSTON, MASS.

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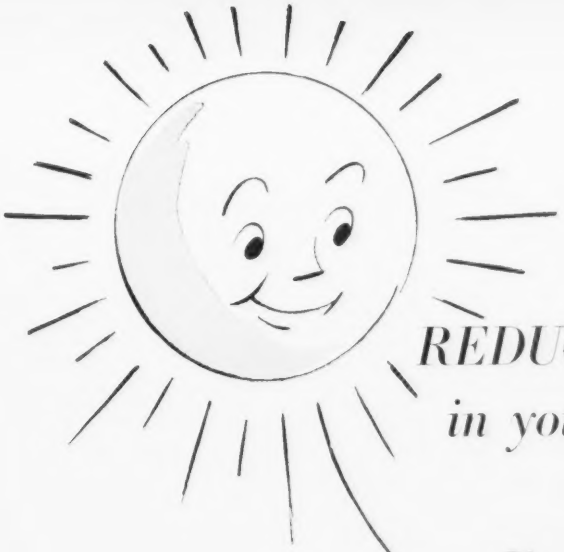

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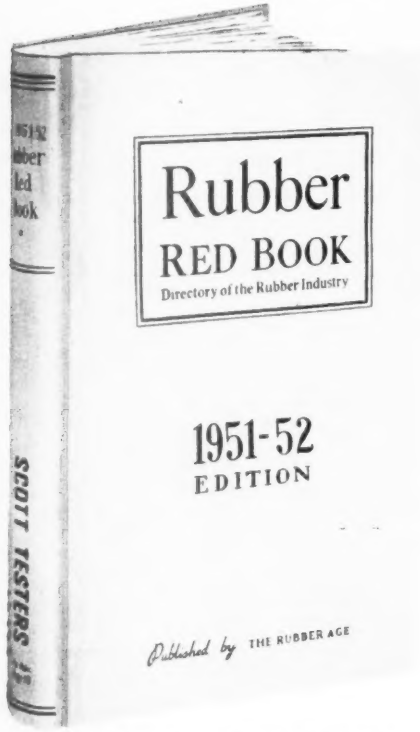

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Published on the 15th of each month by
PALMERTON PUBLISHING COMPANY, INC.

Printing Office,
East Stroudsburg, Pa.

Editorial and Advertising Offices,
250 West 57th St., New York 19, N. Y.

New England Representative—F. ROYAL CAREY, P.O. Box 133, Providence, R.I.

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Entered as Second Class Matter, October 20, 1933, at the Post Office at East Stroudsburg, Pa., under Act of March 3, 1879. Subscription Rates: Domestic, $3.00 a year; Canada, $3.50; Foreign, $4.00. Single copies up to 3 months old, 35 cents; over 3 months old, 50 cents. Telephones: COlumbus 5-2923, 5-2924.

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RUBBER AGE

Vol. 70, No. 5 FEBRUARY, 1952

The Application of Titanium Pigments in Rubber and Plastic Compositions

By JOSEPH BRECKLEY

Technical Service Staff, Rubber and Plastic Division, Titanium Pigment Corporation, New York 13, N. Y.

THE discovery of titanium is attributed to the Reverend William Gregor who, in 1791, reported the presence of an unknown metallic oxide in black magnetic sands found in Cornwall, England. In 1795, M. H. Klaproth, the discoverer of uranium, separated a white oxide from a mineral now known as rutile and noticed the similarity of this oxide to that previously described by Gregor. Klaproth named the new product "titanium," in honor of the mythological Titans.

It is interesting to note that these men, before 1800, also discovered the fundamental chemical reactions on which today's titanium pigment industry is based. However, nothing much was done with it and over a hundred years later titanium still was regarded as a chemical curiosity and a rare element. It was not until 1918 that the manufacture of titanium pigments was begun by the Titanium Pigment Company, utilizing processes developed by Barton and Rossi.

In spite of the phenomenal development of titanium pigments in the last 25 years and the publicity recently given to titanium metal and the brilliant titania gems, there are many who still consider titanium a scarce material. Actually, titanium ranks as the tenth most abundant element in the earth's crust. It is considerably more plentiful than copper, zinc, lead, or any of the common metals except iron, aluminum, and magnesium.

The relative abundance of titanium, based on data compiled by Berg *(1)*, is shown in Table I. It will be observed that while the supply of titanium is only about one-third that of magnesium, it is 58 times that of copper, 725 that of lead, and 1150 that of tin.

The most important sources of titanium are the natural occurring rutile (TiO_2), the iron titanates, such as ilmenite, and the titaniferous magnetites. Rutile deposits of commercial importance have been found in Florida, Canada, Norway and Australia. Ilmenite deposits are found as black beach sands and in massive rock formations. Large massive deposits are found in Canada, Norway, Russia, Madagascar, and New Zealand. As sands, the ore is found in India, Florida, New Zealand, Portugal, Senegal, Brazil, Australia and throughout the East Indies. Titaniferous magnetites occur in New York, Arkansas, Wyoming, North Carolina, Virginia, and Minnesota, the most important being the deposits at Lake Sanford, N. Y., and Iron Mountain, Wyoming.

Chemistry of Titanium

Titanium has an atomic weight of 47.9 and an atomic number of 22. Several isotopes are known with atomic weights of 46 to 50. Its specific gravity is 4.5. Its melting point is about 3150° F. It is a weak base forming or acid-forming element and is truly amphoteric. Its basic character is shown in the form of titanium salts, such as titanium tetrachloride ($TiCl_4$), and its acidic form in titanates, such as lead titanate ($PbTiO_3$).

Titanium is polyvalent, the most common valence being 4 as in titanium dioxide. It also forms compounds

Note: This article is based on talks of a similar nature given by the author before various local rubber groups during the past year.

TABLE I—DISTRIBUTION OF ELEMENTS IN THE EARTH'S CRUST

Oxygen	49.52	Phosphorus	0.12
Silicon	25.75	Carbon	0.087
Aluminum	7.51	Manganese	0.08
Iron	4.70	Sulfur	0.048
Calcium	3.39	Chromium	0.033
Sodium	2.64	Zirconium	0.023
Potassium	2.40	Nickel	0.018
Magnesium	1.94	Copper	0.010
Hydrogen	0.88	Zinc	0.006
Titanium	0.58	Lead	0.0008
Tin	0.00005		

in which it has valences of 2, 3, and 0. Solutions of the quadrivalent salts are readily hydrolized to form insoluble hydrated titanium oxides.

The element combines with oxygen and the halogens with incandescence to form the corresponding compounds. It combines with sulfur and carbon to form sulfides and carbides. It combines with hydrogen to form a structural compound, similar to an alloy, from which hydrogen can be liberated slowly by heating.

Titanium reacts readily with nitrogen, resembling boron and magnesium in this respect. When burned in air it forms the nitride as well as the oxide and this property is utilized in the steel industry where titanium is known as a scavenger. It can be alloyed with iron, copper, aluminum and other metals. Typical titanium compounds are shown in Table II.

Titanium dioxide is by far the most important compound of titanium. It is best known for its pigmentary properties, but it also has many applications in the ceramic and metallurgical industries where its chemical and physical properties are of predominant value. It may exist in three crystalline forms—anatase, rutile, and brookite. All are found in nature, and all have been produced synthetically, but only the anatase and rutile forms are produced commercially.

Titanium Dioxide Pigments

The prime requisites for a pigment are high refractive index and fine particle size. Chemical and physical stability and low specific gravity are also desirable characteristics and extreme whiteness, of course, is indicated for a white pigment. Titanium dioxide possesses all these properties to a very high degree.

The refractive index of a pigment must be high in order to develop opacity or hiding power in oil, rubber, or other media. Titanium dioxide has the highest refractive index of any white pigment. Titanium dioxide is white because it reflects to a very high degree all wavelengths of visible light.

As is the case with all powders, titanium pigments are composed of fine and coarse particles, as well as aggregates. Therefore, the apparent particle size will vary according to the medium in which the pigment is dispersed and the amount of work performed in dispersing it. Particle size measurements, as determined with the centrifugal sedimentation technique, show that particles ranging from 0.1 to 1.0 micron in diameter are present when titanium dioxide is dispersed in linseed oil on a three-roll paint mill. Approximately 93% of the particles are smaller than 0.5 micron, 53% finer than 0.3 micron and 15% less than 0.2 micron, the average being about 0.3 micron. The particles will be somewhat finer when the same pigment is dispersed in rubber on a two-roll mill. An average diameter of 0.17 micron has been obtained for such dispersions.

Titanium dioxide is extremely stable. Since a very high temperature is required to melt it, temperatures normally encountered in its application as a pigment will induce no color changes nor cause decomposition. It will not dissolve in water, organic acids, dilute alkalies, nor in most inorganic acids. Only hot concentrated sulfuric or hydrofluoric acids will dissolve titanium dioxide. Furthermore, it is unaffected by gases, particularly those encountered in the atmosphere. Although normally, titanium dioxide is reduced only with difficulty, it is converted to lower oxides under certain conditions in the presence of organic matter.

Titanium dioxide pigments contain 94 to 99% titanium dioxide depending on the grade of pigment and the amount of modifying materials purposely added to produce certain effects. The small amount of impurities present consist essentially of alkaline and metallic oxides. Copper, manganese, and iron, which are of particular interest to rubber chemists, are present only in minute quantities, the amounts being 2 to 4 parts per million of copper, ½ ppm of manganese, and about 40 ppm of iron.

Some physical properties of titanium dioxide are shown in Table III.

Manufacture of the Pigments: Solutions of quadrivalent titanium salts are readily hydrolyzed by heating, by the addition of alkali, or by dilution to form insoluble hydrous titanium oxides. Advantage of this is taken in the manufacture of titanium pigments; the current processes involve the solution of the titanium followed by precipitation by hydrolysis, washing the precipitate, and finally calcining to produce titanium dioxide.

In the chloride process, volatile chlorides of titanium, silicon, and iron are formed by heating the ores in a current of chlorine. The $TiCl_4$ is separated by fractional distillation, dissolved in water, and then hydrolyzed to form the hydrated oxide. The $TiCl_4$ may also be decomposed in the vapor phase at elevated temperature to produce titanium dioxide and regenerate chlorine.

In the fluoride process, the ore is treated with ammonium fluoride or bifluoride. The soluble titanium compounds are extracted and titanium hydrate is precipitated with ammonia. Both the chloride and fluoride processes are very corrosive and the costs of operations and reactants are higher than for the sulfate process.

In the sulfate process, the finely ground ore and strong sulfuric acid are added to a digestion tank and heated. An exothermic reaction takes place which under certain conditions can become very violent. The mixture passes through a pasty stage and finishes as a comparatively dry mass. The cake is then dissolved under carefully controlled conditions of temperature and concentration

TABLE II—TYPICAL TITANIUM COMPOUNDS

Titanium Metal,	Ti
Titanium Hydride,	TiH, TiH_2
Titanium Carbide,	TiC
Titanium Nitride,	TiN, Ti_2N_3, Ti_3N_4
Titanium Alloys with	(Fe, C, Al, Cu, Mn, Ni, Cr, etc.)
Titanium Sulfates,	$Ti(SO_4)_2 \cdot 2H_2O$, $TiOSO_4 \cdot 2H_2O$, $TiOSO_4 \cdot H_2SO_4 \cdot 2H_2O$
Titanium Halides,	$TiCl_4$, TiF_4, $TiOCl_2 \cdot H_2O$, $TiCl_3$
Titanates with	Na, Ba, Ca, Sr, Zn, Pb, Cd, Fe, Ni, etc.
Titanium Oxides and Hydroxides,	TiO, Ti_2O_3, TiO_2, TiO_3, $Ti(OH)_4$, $TiO(OH)_2$

and the resulting solution of iron and titanium sulfates is treated with metallic iron to insure the reduction of all iron to the ferrous state. After clarification and sedimentation the supernatant liquor is decanted and cooled to cause the crystallization of a large proportion of the iron as ferrous sulfate. The hydrous oxide is then precipitated from the solution by hydrolysis.

The hydrated oxide is calcined at a temperature which may reach 1000° C. to develop increased opacity and optimum pigment properties. In this operation, water and sulfuric acid are driven off, crystalline structure is developed, and the index of refraction is increased from about 1.75 for the hydrate to 2.5 for the anatase crystal or to 2.7 for the rutile crystal. Prior to calcination various agents are added to the hydrate to control particle size growth, to obtain optimum hiding power and color, and to inhibit or accelerate the conversion from anatase to the rutile crystalline structure.

Different Grades Available: There are available many grades of titanium dioxide pigments having either the anatase or rutile crystalline structure. Some are modified by surface treatments to produce specific characteristics in different media, such as superior chalk resistance or color retention in particular types of paint films, or to improve the dispersion and suspension qualities of the pigment in water.

However, all of the modified pigments do not impart to rubber or plastics the benefits they contribute to the other systems. Consequently, this discussion will be simplified by considering only the products of particular interest to these industries.

Generally, the modified anatase pigments produce about the same properties in rubber as the untreated grade. Therefore the term "anatase," whenever it appears, will indicate the unmodified titanium dioxide pigment having the anatase crystalline structure. On the other hand, some of the modified rutile pigments do improve the properties of rubber and they will be mentioned by trade-names whenever they are discussed. Otherwise the term "rutile" indicates a rutile form of titanium dioxide which has been modified by a small amount of alumina.

There is also available a rutile titanium-calcium pigment which is utilized to a considerable degree in the rubber industry. This is composed of 30% rutile titanium dioxide and 70% calcium sulfate, a precipitated and calcined form of calcium sulfate having the anhydrite crystalline structure. This product is somewhat coarser than the straight oxide pigments, the average diameter of its particles ranging from 0.5 to 0.8 micron.

Titanium Pigments in Rubber

The selection of the proper grade of pigment is only one phase of white rubber compounding. It is also important to select light colored rubber and to avoid the use of any accelerator, softener, filler, or other materials which will cause discoloration or will induce staining or color changes when the rubber is exposed to sunlight. Antioxidants were usually eliminated from white rubber prior to the war, but recently several non-staining products have been developed which seem to have considerable merit.

Effect on Physical Properties: The titanium dioxide pigments are finely divided and, like other materials of similar particle size, they will reinforce rubber to a considerable degree. In this respect they are fully equal to the common zinc oxides and precipitated calcium carbonates and compare favorably with the fine particle zinc oxides and the ultra fine carbonates. High resilience, high moduli and good tear and abrasion resistance can be developed in rubber by high loadings of titanium dioxide.

TABLE III—SOME PHYSICAL PROPERTIES OF TITANIUM DIOXIDE

	Anatase	Rutile	Brookite
Structure	Tetragonal	Tetragonal	Rhombic
Specific Gravity	3.9	4.2	4.1
Mean Refraction Index	2.52	2.76	2.63
Mohs Hardness	5-6	6-7	——
Thermal Conductivity (cal./cm./sec./° C.)	0.430	0.148	——
Specific Heat (3)	——	0.1707 c/g.	——
Specific Heat (4)	——	0.179 c/g.	——
Dielectric Constant (5)	31	——	——
Dielectric Constant (6)	——	114	——
Electrical Conductivity (mho per cm.)			
At room temp. (1)	——	$0.2\ 1.0 \times 10^{-10}$	——
At 500° C. (2)	5.5×10^{-5}	——	——
At 1200° C. (2)	——	0.12	——
Melting Point	——	1825° C.	——

Notes: (1) Determined by Titanium Pigment Corp. on pellets hydraulically compressed and fired at 1500° C. (2) *Bull. Soc. Chem.*, Vol. 14, pp. 6-17 (1944); determined at 42% porosity. (3) Calculated by Martin, Titanium Pigment Corp. (4) Calculated by J. W. Richards. (5) International Critical Tables, Vol. 6, p. 99 (1929). (6) Behrisch and Bell, *J. Appl. Phys.*, Vol. 13, p. 683 (1940).

The titanium-calcium pigment does not reinforce rubber to as great a degree as titanium dioxide pigments due to the larger particle size of the calcium sulfate component. However, the calcium sulfate is more finely divided than many of the cheaper fillers, such as ground calcite whiting, and therefore a given amount of this composite titanium-calcium pigment will impart better physical properties to rubber than an equal loading of a mixture of 30% titanium dioxide and 70% of some coarse filler.

All grades of titanium pigment are slightly alkaline (the pH of their water slurries range from 7.0 to 8.2) and when present in rubber in high concentrations they may slightly activate some of the popular accelerators.

Tinting Strength: Since titanium pigments are used primarily in the production of white and tinted stocks, it is important to know the relative tinting strength or brightening power of the different grades. This can be determined by measuring the amount of light which is reflected from the surfaces of vulcanized rubber slabs containing varying amounts of each pigment—the greater the reflectance the brighter the sample.

In an investigation conducted by our laboratory on this score, the base composition used was a "gum" stock and the mixes were prepared by blending masterbatches of the pigments with a masterbatch of the vulcanizing agents and preblended rubber. The reflectance data were obtained with a General Electric Recording Spectrophotometer. This instrument automatically draws a continuous curve showing the amount of incident light, in terms of a standard white (MgO), which is reflected from the specimen as the wavelength of the light is varied at a uniform rate from 390 to 700 millimicrons.

In Fig. 1 are shown the reflectance values for the 550 millimicron wavelength, which were developed by anatase, rutile, and rutile-calcium pigments. It will be noted that about 8 parts of the rutile oxide, 10 parts of the anatase, and 30 parts of the rutile-calcium pigment will produce the same values. This relation is more clearly depicted in Fig. 2.

The data for the curves in Fig. 2 were obtained from rubber containing 10 parts of anatase, 7.5 parts of rutile, and 30 parts of rutile-calcium pigments. They were

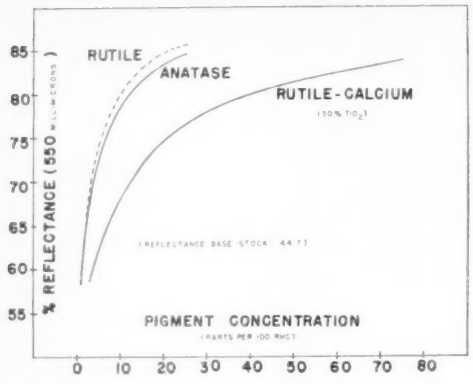

FIG. 1—Light reflectance for the 550 millimicron wavelength of rubber compositions containing varying amounts of titanium pigments.

determined in the same manner and with the same basic formulation described in the previous experiment.

However, these results are for the entire spectrum and not for a single wavelength and, therefore, some information about the color tone of the pigments can also be gained from them. A perfect white will have a value of 100% for each wavelength and the curve for such a product will be a straight line parallel to the X axis.

It will be seen that the curves for 7.5 parts of the rutile oxide and 30 parts of the rutile-calcium pigment are identical throughout the entire spectrum. Furthermore, the curve for 10 parts of anatase oxide coincides with the others from the 550 through the 700 wavelengths. However, below the 550 wavelength the anatase sample reflects more light than the others. This higher reflectance of blue light by the anatase oxide is significant; it indicates a bluer tone for this pigment.

These curves bear out that which is apparent from a visual inspection: the brightening or tinting strengths of these pigments are about in the ratios given. However, the anatase pigments more nearly approach a perfect white and therefore are preferred when the "whitest" white and the cleanest tints are required.

It will also be noted that there is a very sharp drop in the reflectance of the rutile samples at the 300 wavelength. The significance of this drop will be discussed later.

Effect of Sunlight: In discussing the effect of sunlight on rubber pigmented with titanium dioxide, the effects on both color and surface crazing must be considered. These will be treated separately, as follows:

(1) Effect on Color: It was discovered in prewar research on white sidewall stocks that rubber containing anatase grades of titanium pigments would discolor in sunlight unless substantial amounts of zinc oxide were present. This was believed to be due to the reduction of titanium dioxide in the presence of organic matter.

The development of new rutile pigments necessitated a review of this work, so samples of vulcanized rubber containing various grades of titanium dioxide were exposed to direct sunlight. The basic formulation was an altered white sidewall recipe without wax. The zinc oxide was reduced to an amount required for accelerator activation and the titanium dioxide content was increased to a 25 volume loading (per 100 parts by weight of rubber hydrocarbon). This composition was selected in order to accentuate the effect of the different pigments and to minimize the effect of the zinc oxide.

The reflectance values, before and after 12 weeks' exposure to the summer sun, are charted in Fig. 3. These data were determined with a Hunter Reflectometer using amber, green, and blue filters. They correspond approximately to the values obtained with the General Electric Recording Spectrophotometer at 500, 550 and 420 wavelengths.

The significance of the curves will be evident if the reflectance is considered as the quantity of light which is reflected from the sample. The quality or color tone of the reflected light is indicated by the difference in

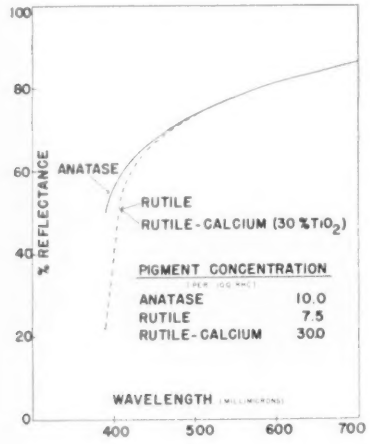

FIG. 2—Relative reflectance for the entire spectrum of rubber compounded with different types of titanium pigments.

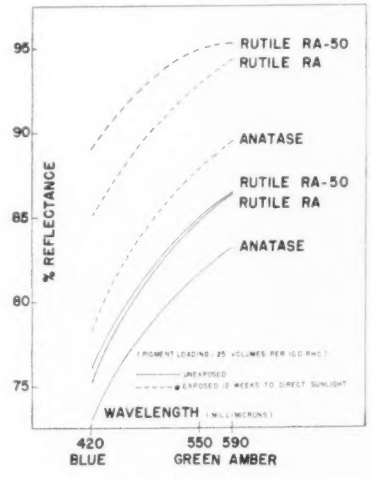

FIG. 3—Effect of outdoor exposure on the reflectance of rubber pigmented with titanium dioxide.

FIG. 4—Crazing of rubber pigmented with titanium dioxide after 12 weeks of outdoor exposure. (15 X).

the amber and blue reflectance values—the greater this difference the more yellow the tone of the rubber. As stated previously, a perfect white will produce values of 100 for every wavelength of visible light and thus its curve will be a straight line parallel to the X axis. Therefore, the slopes of the curves on this chart will be indicative of the color tone of the rubbers.

It is evident from these curves that the unexposed rutile stocks are brighter (have greater reflectance) and are slightly more yellow than the anatase compound. It will be noted also that all become brighter after exposure. However, the anatase sample yellows somewhat during exposure, whereas the rutile stocks become whiter, especially that containing the RA-50 pigment. (The RA-50 pigment is a modified rutile pigment which will impart superior chalk resistance to paint films and it therefore is termed a "chalk-resistant" rutile pigment.)

These differences are readily apparent when the samples are examined visually. The anatase stock is definitely yellow, almost tan in tone, whereas the others are much whiter.

(2) Effect on Surface Crazing: The rubber samples previously described were examined periodically during exposure. It was noticed that there were some variations in the rate and degree of chalking during the test and in the appearance of the surface after the completion of the test. Photomicrographs of the surfaces of the three samples after exposure are reproduced in Fig. 4. The anatase stock crazed considerably, the RA sample perceptibly, but the RA-50 compound was free from crazing. These tests are believed to be significant since there are many indications that surface crazing is the forerunner of cracking when white rubber compounds are exposed outdoors.

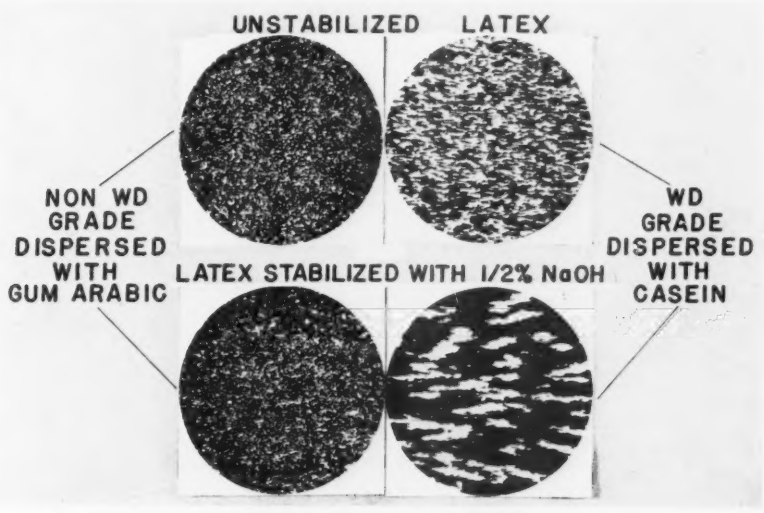
UNSTABILIZED LATEX
NON WD GRADE DISPERSED WITH GUM ARABIC
WD GRADE DISPERSED WITH CASEIN
LATEX STABILIZED WITH 1/2% NaOH

FIG. 5—Dispersion characteristics of titanium pigments in natural rubber latex. (80 X).

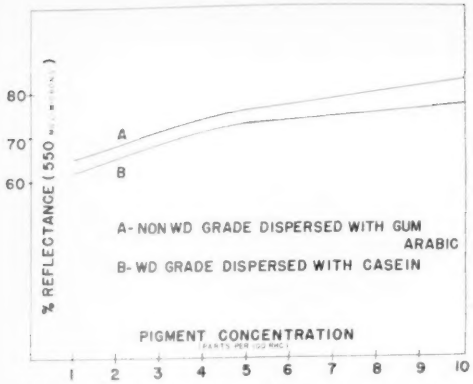

FIG. 6—Effect of titanium pigments on the reflectance of rubber deposited from latex compounds.

Titanium Pigments in Latex

Titanium pigments, like other powdered compounding ingredients, are dispersed in water prior to their incorporation into latex. All grades can be used satisfactorily in latex except the rutile-calcium pigment which normally will induce coagulation unless the latex is specially stabilized.

Some titanium pigments will disperse readily in water without the aid of any wetting or dispersing agents and others cannot be so dispersed unless some such agent is present. In this discussion the first type will be termed WD (water dispersible) and the other non-WD pigments. Either type may possess the anatase or rutile crystalline structure.

All titanium pigments can be classified according to their water dispersing characteristics and all members of each class act similarly. Therefore, it was decided to limit this discussion to one representative member of each group, namely, the WD and the non-WD grades of untreated anatase pigments.

The WD pigment can be dispersed readily in water at 50 to 60% solids concentration by grinding in a ball or colloid mill, or by high speed agitation alone. Grinding is suggested, however, in order to eliminate the possible presence of any undispersed pigment aggregates. This pigment requires no dispersant and none of the common dispersing or wetting agents should be used with it as they prevent, rather than help, the dispersion of this pigment in water. Casein, however, does help in this respect and it provides some stabilizing effect as well.

Water dispersions of the WD pigment, even when protected with casein, are rather easily flocculated by small amounts of alkali. Since alkaline materials and dispersing agents are both present in most latex mixes, the use of this pigment is not generally recommended for latex compounding.

The non-WD grade of pigment will not disperse in water without a dispersant and most dispersing agents and alkalies are of value for this purpose. Casein is a good dispersant for this grade also and it will produce dispersions of this pigment which are more stable than similar systems with the WD product.

Gum arabic is an outstanding dispersant for the non-WD pigments. It not only is an excellent dispersant, but it acts as a protective colloid as well. Slurries of these pigments produced with gum arabic are extremely stable, especially in the presence of alkali. Because of this it will produce whiter and brighter latex stocks than can be prepared from the WD-casein solutions. Gum arabic will not disperse the WD pigments.

Gum arabic is cheap, readily available and extremely easy to handle. It can be added as a dry powder directly to the charge. The recommended procedure is to grind the pigment overnight in a ball mill at 50 to 60% solids with 1 to 4 percent (based on the dry pigment) of the gum. Usually 2 percent of the gum is ample. Dispersions satisfactory for many uses can be prepared in a colloid mill and in some cases by high speed agitation alone.

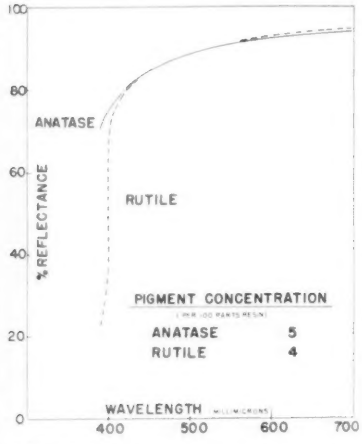

FIG. 7—Effect of anatase and rutile titanium dioxides on the reflectance of vinyl compositions.

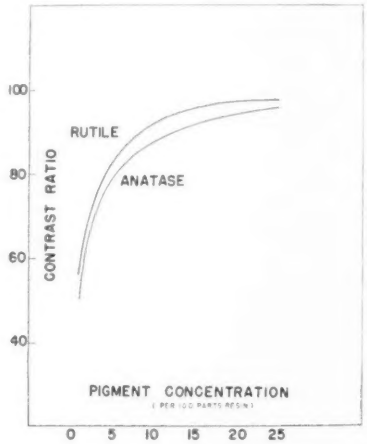

FIG. 8—Opacity of vinyl films pigmented with titanium dioxides. (Film thickness: 0.005-inch).

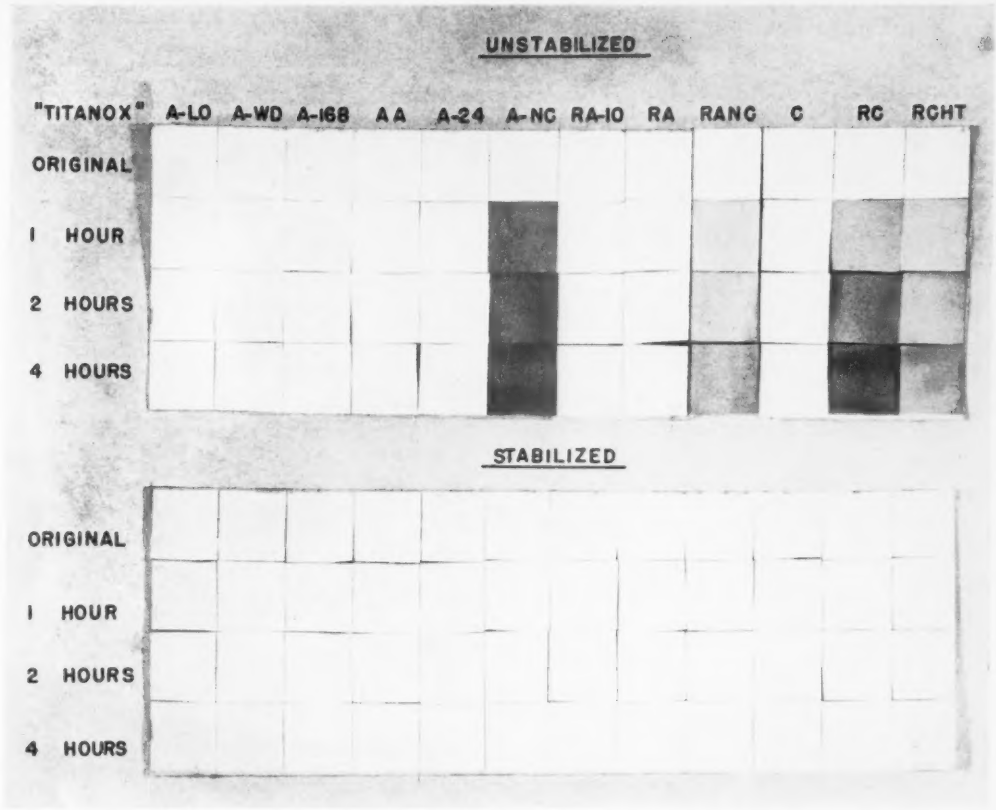

FIG. 9—Effect of titanium pigments on the heat stability of vinyl resins. (Heated in air at 300° F.)

The same general procedure is suggested when casein is the dispersant for either grade of pigment. However, the casein should first be dissolved in water with the aid of ammonia or alkali. Approximately 3 percent of casein, based on the pigment, is recommended.

Dispersions of the non-WD pigments prepared with either dispersant or the WD grade dispersed with casein are thin watery slurries at 50% solids concentration. The casein dispersions will froth, but those with gum arabic are entirely free from air. Some sedimentation occurs if these slurries stand quietly, but the sediment in all cases will be fairly soft and can be redispersed quite readily. Both dispersants will putrefy and some preservative should be used with them if the slurries or latex mixes are not used quickly.

It is frequently desired to disperse the titanium pigments along with the accelerators and vulcanizing agents using a dispersant such as Darvan. The non-WD pigments are recommended in such cases although either grade can be used due to the low pigment concentration generally present in these mixes.

The rutile pigments in latex compounds will develop about the same tinting strength, relative to the anatase products, as was demonstrated in dry rubber formulations.

In Fig. 5 is illustrated the degree of dispersion in stretched latex films obtainable with the non-WD pigment dispersed with gum arabic and the WD grade with casein. Notice the flocculation of the WD type, especially in the latex which contains the added alkali, the flocks being oriented in the direction of strain.

Further evidence of the improved pigmentation developed by the non-WD pigments dispersed with gum arabic is shown in Fig. 6. These reflectance values indicate that one part of this pigment will provide about the same degree of pigmentation as 1.5 to 2.0 parts of the WD grade, especially at the higher concentrations.

Titanium Pigments in Vinyl Plastics

Titanium pigments are finding wide application in the relatively new field of vinyl plastics. Some of the specific properties imparted by these pigments will be discussed below.

Tinting Strength in Vinyl Resins: The curves in Fig. 7 illustrate the relative strength of titanium pigments in a vinyl composition consisting of 100 parts of resin and 50 parts of plasticizer (DOP).

It will be noted that these pigments develop higher reflectance values in vinyls than in rubber. Five parts of the anatase oxide in these tests produced a value of 90% at the 550 wavelength whereas the figure for 25 parts

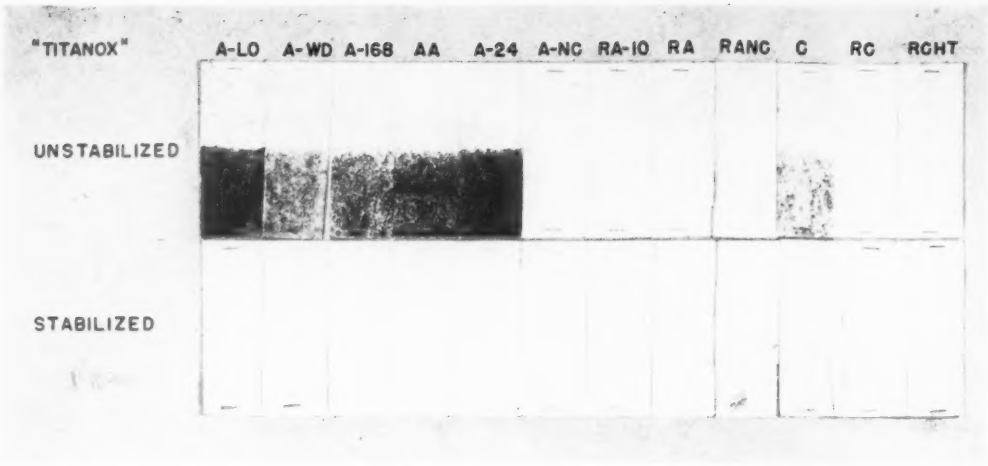

FIG. 10—Effect of titanium pigments on light stability of vinyl resins exposed to direct sunlight for 8 weeks.

of the same pigment in the previous rubber tests was only 84%. In other tests, one and two parts of the same pigment produced values of 80.5% and 85.8%, respectively, in the same vinyl formulation.

The difference in the color tone of these pigments is more pronounced in vinyls than in rubber. The higher reflectance in the red and the lower blue values, characteristics of the rutile pigments, are clearly evident from the curves. The reader's attention is again directed to the low reflectance values of the rutile compound at the 390 wavelength.

Opacity of Vinyl Films: The relative opacities developed in vinyl films by the anatase and rutile oxides are quite in line with their relative tinting strengths. This relation is shown in Fig. 8, the base stock in this experiment being the same as used in the tinting strength tests described above.

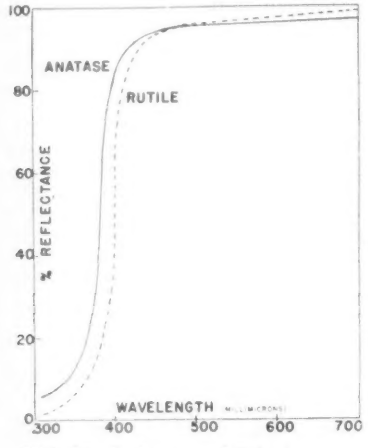

FIG. 11—Reflectance of light from compacted anatase and rutile titanium pigments.

Heat Stability of Vinyl Compounds: A series of pigmented vinyl films which have been heated in air at 300° F. are shown in Fig. 9. The unstabilized stocks consisted of 100 parts of resin, 50 of plasticizer, and 5 of pigment. The stabilized compounds contained an additional 5 parts of dibasic lead phthalate.

Several of the unstabilized compositions darkened quickly in this test. The pigments in each contained 0.5 to 1.0 parts of zinc oxide. Otherwise there was little difference between the effect of the anatase and rutile pigments on the heat stability of vinyl compositions.

It will be noted that none of the stabilized samples darkened in this manner. This indicates that the pigments containing zinc oxide might be used safely in many practical applications. These results have been confirmed in hot milling tests at 350° F.

Light Stability of Vinyl Resin: The effect of the same pigments discussed above on the light stability of vinyl resins is indicated in Fig. 10. All the samples which darkened in the unstabilized series were compounded with the anatase grade of pigments. Those which remained white contain rutile pigments. The addition of stabilizer greatly improved the stability of the anatase pigments, but signs of discoloration are evident on some of these compounds.

Similar results were obtained when the same samples were exposed in a Weather-O-Meter. The unstabilized anatase samples exposed for 255 hours, and the unstabilized rutile samples exposed for 484 hours, were almost identical in appearance to those shown in Fig. 10. Many other similar light exposure tests have been made and in every case the rutile pigments have proved to be definitely superior to the anatase pigments.

These comparisons are presented to illustrate the superiority of the rutile pigments, but they do not mean that the anatase oxides cannot be used successfully in vinyl compositions. The anatase pigments also improve the light stability of vinyl compounds and they are entirely satisfactory for most applications.

The preliminary results of a study of the behavior of titanium pigments in other resins indicate the same superiority for the rutile oxides in the general plastics field.

Melamine resins pigmented with the anatase oxides become bluish when they are exposed to ultraviolet or to direct sunlight due to the formation of a lower oxide of titanium. A decided improvement in color stability can be obtained by replacing the anatase with a rutile pigment, especially a "chalk-resistant" rutile.

Polyethylene degrades and becomes brittle rather rapidly when exposed to ultraviolet or to direct sunlight *(2)*. Its light resistance is improved only slightly by the addition of anatase titanium dioxide, but to a considerable degree by rutile pigments, particularly a "chalk-resistant" grade.

Optical Properties

It is evident from the illustrations discussed to this point that rubber and certain resins are more resistant to the deteriorating effect of sunlight when they are pigmented with the rutile rather than the anatase crystalline form of titanium dioxide. It is believed that this superiority is due, at least in part, to the greater absorption of the harmful ultraviolet rays of sunlight by the rutile crystals.

Evidence to support this contention is presented in Figs. 11 and 12. The curves show: (1) A rutile pigment reflects the shorter wavelengths of light to a lesser degree than an anatase oxide, and (2) Light shorter than 410 millimicrons in wavelength is not transmitted through a pure rutile crystal.

The first of these, Fig. 11, contains reflectance values obtained from discs of compacted dry pigments containing no binder. Note the difference in the light reflectance characteristics of the two pigments, particularly at the 390 wavelength. At that point the anatase reflects 74% of the incident light, but the rutile reflectance is only 22%.

The light transmission characteristics of a pure rutile crystal are shown in Fig. 12. It will be noticed that the longer wavelengths of light are readily transmitted through this crystal, but there is a sharp cut-off at 410 millimicrons—no light of a shorter wavelength is transmitted through this crystal.

Summary

Titanium dioxide pigments of the rutile crystalline structure have greater tinting and opacifying strengths than anatase oxides.

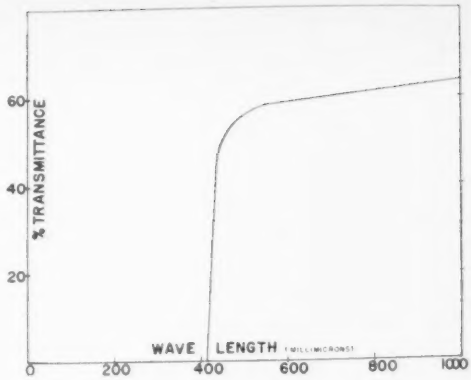

FIG. 12—The transmission of light through a pure rutile crystal (2 mm thick).

The anatase pigments are "whiter" than the rutile products.

White rubber and plastics will withstand exposure to light and weather most successfully when pigmented with the rutile pigments, particularly the "chalk-resistant" grades.

The non-water dispersible types of titanium pigments form the most stable pigment-in-water dispersions.

ACKNOWLEDGMENT

The author wishes to thank G. W. Corddry for permission to publish these results. Thanks are also due to H. V. Alessandroni, W. K. Nelson, A. E. Jacobsen, and other members of the Research Laboratories of the National Lead Company—Titanium Division, for their cooperation in obtaining reflectance, transmittance, and other data. The assistance of E. J. Dunn, Jr., of the National Lead Company, in preparing the photographic material also is gratefully acknowledged.

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(2) Wallder, V. T., Clarke, W. I., DeCoste, J. B., and Howard, J. B., *Ind. Eng. Chem.*, Vol. 42, p. 2320 (1950).

Pliovic Latex 300—A New Vinyl Latex

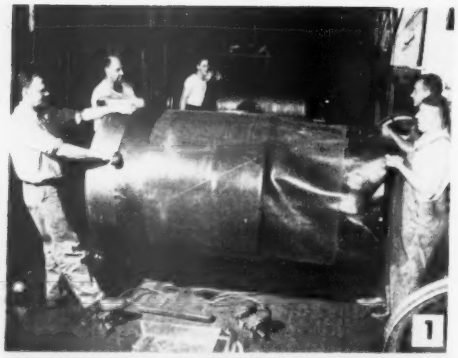
THE first in a series of new vinyl resin latices is now being produced for commercial consumption by the Goodyear Tire & Rubber Company, Akron, Ohio. Announcement on the new product was made by H. R. Thies, manager of Goodyear's Chemical Division. It is being produced at the company's Niagara Falls, N. Y. manufacturing subsidiary, the Pathfinder Chemical Corporation.

Known as Pliovic Latex 300, the vinyl latex was described at Goodyear's Research Laboratory as an aqueous dispersion of a vinyl chloride copolymer, and is the most recent development in Goodyear's vigorous expansion in the vinyl field.

Completion of a preliminary testing program indicates that the vinyl latex should find wide use in the textile and paper coating industries. Grease-proofness, chemical resistance, and resistance to moisture are some of the special properties imparted to fabrics and papers coated with the material. Physical properties are also improved. Typical other uses are as pigment binders for inks and paints, as binders for non-woven fabrics and felt, and as a sizing for textiles.

Vinyl latices are less costly to use than other vinyl dispersions, and because they do not include volatile solvents, processing problems of toxicity and flammability are eliminated. Another advantage is that water penetrates fibers more completely than other dispersing media so that a compounded latex will form a very thin film of more complete continuity and with better adhesion to the fiber.

BUILDING EARTHMOVER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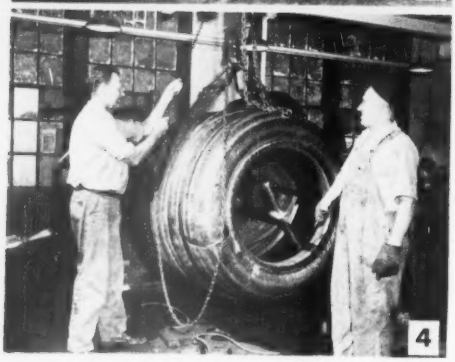
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BUILDING one of the big earthmover tires manufactured by the Goodyear Tire & Rubber Co. is one of the biggest jobs in all tire-making. Earthmovers constitute the biggest type of tire built by Goodyear. They range in size all the way from 16.00 x 24 to 30.00 x 33, varying in over-all diameter from 42 inches to better than 94 inches. Some of the largest of these units weigh more than a ton and are used on vehicles transporting loads up to 50 tons. Earthmovers are, of course, used for large-scale off-the-road operations, work involving the moving of great quantities of dirt, rock and similar materials.

Tires of the earthmover type are indispensable to the nation's great construction industry. They equip the thousands upon thousands of heavy vehicles used in the construction of highways—graders, tractors, scrapers and many others. Only by putting this type of equipment on rubber can contractors hope to keep up with the tremendous demands of road building, road maintenance and the really heavy jobs. Dam-building projects, deep and surface mining, logging, laying of transcontinental pipelines and construction of big buildings are just a few of the tasks falling within the earthmover's line of duty.

Building an earthmover takes considerable time. These tires are not turned out in a comparatively short period as are passenger tires. It requires from 6 to 18 hours to build one of these huge units, depending, of course, upon the size of the tire being built. At Goodyear, the men building earthmovers are veteran employees with long experience in this work. In fact, at the present time there is no employee engaged in building this type of tire who does not have from 30 to 40 years' experience with the firm.

Construction of an earthmover starts with the placing of the first fabric band of the tire on the tire-building drum. Each band consists of two plies running in opposite directions. Successive bands are then added, up to 10 or more (according to tire size) and consisting of

1—In the initial step of building an earthmover tire, in this case a 24.00 x 29, operators place the first band on the tire-building machine.

2—In this photograph, the first bead is being placed on the earthmover unit. The tire's bands are turned up around the bead so as to tie the latter in to the plies.

3—In the final stage of the building process, before being shaped, the sidewall of the earthmover is trimmed.

4—Here, the earthmover is being removed from the tire-building machine. Construction of the tire carcass is now complete and the unit is ready for the next processing steps before curing. The operation shown here is described as "stripping the tire" from the building drum.

TIRES AT GOODYEAR

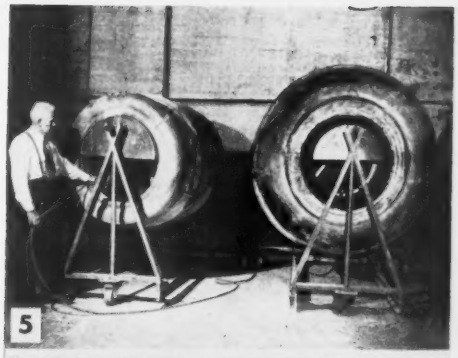
from 20 to 40 plies. The tire's wire beads are added as the construction progresses, there being three different sets of beads which hold the carcass together and serve as its foundation. Then the bands are turned up around the beads, tying them into the plies.

After all the bands have been built up, a chafing strip is placed over the band area as protection against rim cuts and other damage. A breaker band is also added on top of the carcass, acting as a cushion against road shocks and bruises. Finally, the rubber tread and sidewalls are put on. The tire carcass is now complete.

Before the unit goes into the mold for curing, however, there are several more processing steps. They include painting and lining the tire. This is done by applying a soapstone solution inside the casing so that the airbag, which is similar to an inner tube and which is placed inside the carcass to hold it in shape while curing, will not stick to the carcass. In order to prevent sticking, the carcass is dusted on the outside with soapstone.

The next step is one of the most important in the entire process. The big earthmover carcass must be brought into shape before curing. In order to accomplish this, the tire is placed on a large metal frame, a shaping bag placed inside the tire and the bag inflated. The tire is left in this position for about 24 hours. During this interval, the shaping bag and the stretching on the frame bring the carcass to its conventional doughnut shape.

In curing the green tire, it is placed in a huge steel mold, heated and cured at high temperature for anywhere from 4 to 13 hours, according to tread thickness and the tire size. The mold has a top and a bottom section. When curing is complete, the top section is removed by an automatic chain hoist. The same hoist is used to remove the tire itself from the mold. After trimming the flash, and following final inspection, the tire is ready for shipment. The accompanying photographs depict various stages in the manufacture of the earthmover tire.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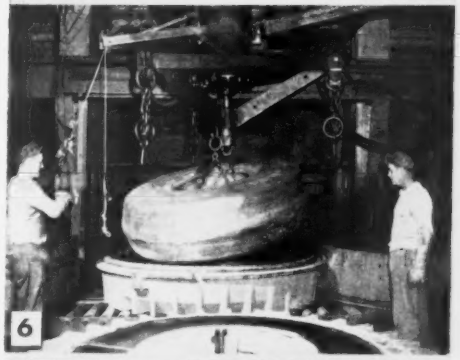
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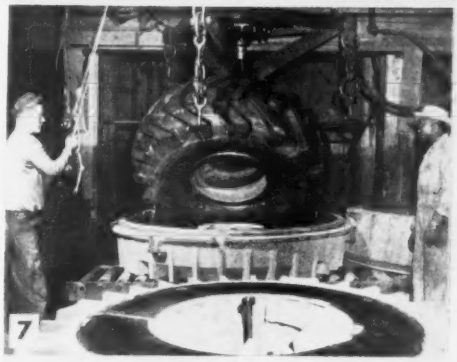
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5—This photograph depicts the tire being shaped before entering the curing mold. At right, the tire appears near the finish of the shaping process.

6—Automatic equipment, as shown here, is used to lower the big earthmover into the mold, preparatory to curing.

7—This is how the earthmover looks when completed, following the curing operation. The tire shown is the grader-type earthworm.

8—Earthworker tires at work are depicted in this photograph. The vehicle shown is a Caterpillar tractor-scraper at work at Oahe Dam, the huge government-flood-control project now in progress near Pierre, S. D. Earthmover tires in the picture are Goodyear's All-Weather tread design.

Testing Butyl Reclaimed Rubber

By E. B. BUSENBURG

Laboratory Manager, Reclaim Division, B. F. Goodrich Co., Akron, Ohio, and Chairman, Technical Committee, Rubber Reclaimers' Association, New York, N. Y.

THE Technical Committee of the Rubber Reclaimers' Association has adopted a simple test formula for Butyl Reclaimed Rubber. The commercial use of Butyl Reclaimed Rubber in large tonnage in a variety of end products, such as automobile tubes, bicycle tubes, radiator hose and automotive shim stocks, has made it desirable to establish this industry-recommended standard test recipe for control and evaluation. The standard test recipe follows:

RECLAIMERS' STANDARD TEST RECIPE FOR BUTYL RECLAIMS

	Parts
Butyl reclaim hydrocarbon	100.0
Zinc oxide	5.0
Sulfur	2.0
Tetramethyl thiuram disulfide	1.0
Mercaptobenzothiazole	0.5

Following are typical tests on a commercial Butyl tube reclaim which contains a Butyl rubber hydrocarbon content of 55%; consequently, 182 parts were used in the recipe:

Min. @ 320° F.	Tensile	Elongation at Break	300% Modulus
5	1020	720	240
10	1375	700	360
15	1420	680	400
20	1460	670	450
25	1570	650	460
30	1525	635	450

Prior to adoption of this recipe, a survey and evaluation was made by members of the committee to compare test recipes used by various reclaim manufacturers for the purpose of control or evaluation of Butyl reclaims. Preliminary comparison of these recipes reduced the types to be given serious consideration to three reclaim-curative recipes and two types of acceleration. These are shown in Table I.

Contamination of Butyl reclaims with other types of rubber must be strictly avoided if a high quality product of uniform characteristics is to be produced. Experience emphasizes the importance of accurate tube sorting and classification, the need for thorough "clean-ups" when processing Butyl tube reclaims, and the importance of stripe marking inner tubes during manufacture. Contamination of Butyl reclaim with undesirable material is best detected by vulcanizing characteristics and a control recipe should be one which is suited to this purpose.

The data in Table II indicate the effect of deliberate contamination of Butyl tube reclaim with natural rubber tube reclaim. The Butyl tube reclaim and natural rubber tube reclaim were refined together in the percentages indicated, to prepare samples for test.

TABLE I—RECLAIM-CURATIVE RECIPES

	A	B	C
Reclaim hydrocarbon	100.0	100.0	100.000
Zinc oxide	3.0	5.0	5.460
Sulfur	2.0	2.0	2.275
Tetramethyl thiuram disulfide	1.0	1.0	1.092
Mercaptobenzothiazole	0.5	0.5	1.092
Selenium diethyl dithiocarbamate	—	—	1.092
Stearic acid	—	1.0	—

Min. @ 320° F.	T	E	M	T	E	M	T	E	M
5	1080	800	180	1000	750	220	1320	700	400
10	1390	800	260	1360	740	290	1600	700	460
15	1390	720	340	1510	740	340	1600	680	520
20	1450	710	420	1500	710	420	1620	640	550
25	1550	710	420	1570	710	410	1670	640	570
30	1420	670	420	1470	680	460	1600	620	630

TABLE II—EFFECT OF DELIBERATE CONTAMINATION OF BUTYL TUBE RECLAIM WITH NATURAL RUBBER TUBE RECLAIM

Butyl Tube Reclaim	Natural Rubber Tube Reclaim	Min. @ 320° F.	Recipe A T	E	M	Recipe C T	E	M
100%	0%	5	1280	630	410	1300	700	400
		10	1480	640	470	1570	700	460
		15	1490	620	500	1600	620	600
		20	1510	620	550	1630	610	730
99%	1%	5	1080	600	360	1320	710	420
		10	1210	620	420	1550	680	480
		15	1340	600	510	1570	580	680
		20	1330	590	540	1440	560	640
98%	2%	5	1090	580	440	1060	690	400
		10	1270	600	500	1180	590	510
		15	1280	550	550	1370	510	680
		20	1310	590	540	1470	520	760
95%	5%	5	820	500	470	950	560	370
		10	850	560	590	1050	510	450
		15	800	510	610	1100	480	590
		20	810	540	590	1100	490	610

Summary

1. Based on this series of tests and data contributed by others the A type recipe appeared to be preferable for the detection of contamination.

2. The mercaptobenzothiazole-thiuram acceleration more closely approximates trade practice in mixtures of new Butyl and Butyl reclaim and it was therefore favored by some users of Butyl reclaim.

3. The three way acceleration in Recipe C is faster, produces snappier cured sheets, and may have sound application in Butyl reclaim recipes for industrial products.

4. In settling upon the standard test recipe, it was decided that stearic acid was not necessary in the curative formulation. Data was also discussed indicating that 5% zinc oxide per 100 parts of hydrocarbon gave slightly better cures than 3%.

5. Comparing curing temperatures, results at 312° and 320°F. were very much better than those obtained at 287°F.

6. Comparative tests made by a number of laboratories indicate that consistent results are obtained in the standard recipe.

A Midcentury Review of Rubber Carbons

By H. A. BRAENDLE

Research Laboratories, Columbian Carbon Co., New York 17, N. Y.

ABOUT the turn of our century three mutually dependent discoveries were made: the gasoline engine powered carriage, the pneumatic tire and the carbon reinforcement of natural rubber treads. The social implications of these are outside the scope of this review. About 1940 there was another three-way coincidence of perhaps still greater significance: a new family of rubbers, a new family of carbon blacks and new means for intelligently fitting these to each other. The first may be said to have given us a new way of life, the second the means to protect that way.

Figure 1 demonstrates the parallel growth of the automotive, rubber and carbon black industries. The black tire tread has recently celebrated its fortieth birthday. During its entire life it has been the subject of intensive study. For 30 of those years the virtues of its two principal components, namely, natural rubber and carbon black, were exploited without a satisfactory understanding of why or how each contributed its share to tire performance or why these two formed such a unique union.

During the last decade, however, three major forward advances in rubber-carbon technology were made, as follows:

(1) Through the discovery of the electron microscope it became possible to photograph and measure carbon black particles *(12)*. Empiricisms of the previous 30 years were rationalized. The full significance of the surface chemistry (pH) of the carbon black was appreciated. Differences in "social habit" of the carbon spheroids emerged. In short, the "Three Building Stones of Carbon Quality" announced in 1944 *(25)* started the industry towards a more intelligent use of carbon black in rubber and elsewhere.

(2) A whole new family of carbons was born and with them has come a revolution in carbon black manufacture. With the precise determination of carbon black particle size a large gap in the center of the carbon black spectrum was revealed. This has since been well populated with carbons of intermediate particle size and with varying degrees of chain structure development. The filling of this gap was in large measure due to the revolution in carbon black manufacture which began at that same time. Not only has the carbon black industry shown that fully reinforcing carbons can be made by furnace processes but also that they can be made from a wide variety of raw materials ranging all the way from methane to heavy residual oils.

The flames of the impingement process in essence comprised millions of reactors, each enclosed in a narrow combustion sheath within which hydrocarbon decomposed to carbon black. Modern furnace processes have replaced the tiny combustion sheath with a relatively huge refractory-lined shell and the thermochemistry of conversion from hydrocarbon to carbon black takes place in these large reactors. Limitations due to time of reaction, concentration of hydrocarbon and ratio of reactant hydrocarbon to heating gas have been broken down making possible a wider variety of end products. Quality controls are emerging as the new art moves toward a science.

(3) Under the urgency of war a full-fledged synthetic rubber industry mushroomed from laboratory and pilot scale operations to sufficient volume to take care of the military needs of the allied nations as well as their essential civilian requirements. The dependence of the synthetic rubber industry on carbon black for its success is so widely recognized as to require no further emphasis. Any residual doubt as to the specificity of carbon black, described by Bostrom and Lange *(3)* as "the carbon effect," was dispelled. There still remains the problem of how this is accomplished.

Three Building Stones of Carbon Quality

Surface: In Figures 2, 3 and 4, taken from an earlier release from these laboratories *(5)*, the overriding influence of specific surface on the reinforcement of natural and synthetic rubber is clearly demonstrated. This justified the selection of surface as a building stone of quality.

pH: The pH of carbon black, discovered in 1937 *(29)*, was at first considered to affect merely the rate of cure of carbon blacks in rubber. It has since been shown *(8)*, as illustrated in Figure 5, that the furnace carbons of neutral to alkaline pH not only produce a faster rate of cure but give a different kind of cure. The reinforcing furnace carbons reinforce the rubber without changing either the rate or kind of rubber-sulfur combination

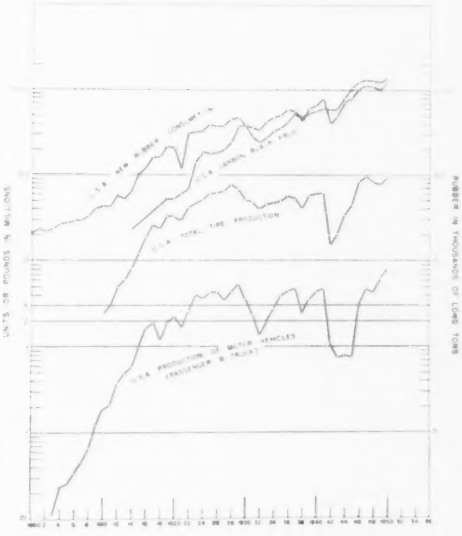
U.S. NEW RUBBER CONSUMED
U.S. CARBON BLACK SALES
U.S. TOTAL TIRE PRODUCTION
U.S. PRODUCTION OF MOTOR VEHICLES (PASSENGER & TRUCK)
UNITS OR POUNDS IN MILLIONS
CONVERSION OF UNITS TONS

FIG. 1—Growth of the automotive, rubber and carbon black industries since 1900.

Note: This paper was presented by the author before the Rubber Division, Chemical Institute of Canada, Kitchener, Ontario, Canada, June 15, 1951.

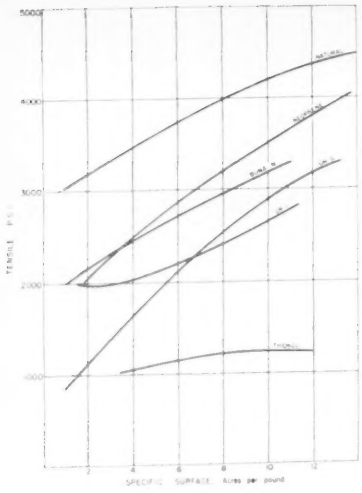

FIG. 2—Trends in tensile versus specific surface for natural and synthetic rubbers.

of the base mix. This, it is believed, contributes to the better aging and flex behavior of furnace carbons over channel carbons.

Structure: In 1941 Wiegand's *(28)* rationalization of carbon properties on the basis of particle size or, more exactly, specific surface showed striking anomalies which led him to divide the family of carbon blacks into three broad groups with typical behaviors in rubber as follows:

(I) Carbon-Rubber Complexes (Reinforced Rubber) are formed. Examples: S. R. Carbons, Statex and Carbon Blacks.*

(II) Carbon-Carbon Complexes or networks are formed in addition to (I). Examples: Acetylene and Lampblacks.

(III) Carbons are inert; neither (I) nor (II) occurs. Examples: Thermal Carbons.

Carbons of Group I became normal by definition because of their wide acceptance for strengthening rubber and because at 50 phr loading all developed the same modulus in natural rubber (see Figure 3). Further studies with the electron microscope *(19)* completely substantiated Wiegand's assumption of a network or reticulate chain structure for blacks in Group II. The contribution of reticulate chain structure and its persistence through mixing has in effect added a new compounding ingredient for rubber.

A careful study of electron photomicrographs of carbons dispersed in rubber reveals that there is some slight association of the individual spheroids of the normal carbons. The spheroids of the thermal blacks give discrete dispersions and evidence of the lack of a carbon-rubber complex in the case of these is illustrated in Figure 6 where a tear through the rubber occurring at the rubber-carbon interface supports the placing of these carbons in Group III possessing neither rubber-carbon complexes nor carbon-carbon complexes.

In Figures 7 and 8 are reproduced the tensile and corresponding modulus curves for a series of carbons in natural and GR-S rubber, shown originally in Alexander's "Colloid Chemistry" (Vol. VI, pp. 424 and 426). As pointed out at that time, the structure carbons or carbon fibers, as they may be regarded, give added stiffness or modulus to all rubbers in excess of what was to be expected from the diameters of their constituent spheroids. It is of interest to note also that in natural rubber this extra modulus is secured at the expense of tensile strength whereas in GR-S the structure carbons pay a dividend in tensile as well as in modulus.

A close examination of the whole series of curves, for blacks and rubbers shown in the reference cited, reveals that in the crystallizable polymers (natural, neoprene and Butyl) the extra modulus due to structure

* At the time of this writing the term "Carbon Blacks" was restricted to impingement type or channel blacks.

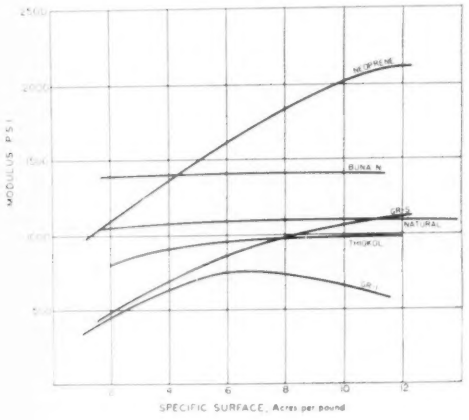

FIG. 3—Trends in modulus versus specific surface for natural and synthetic rubbers.

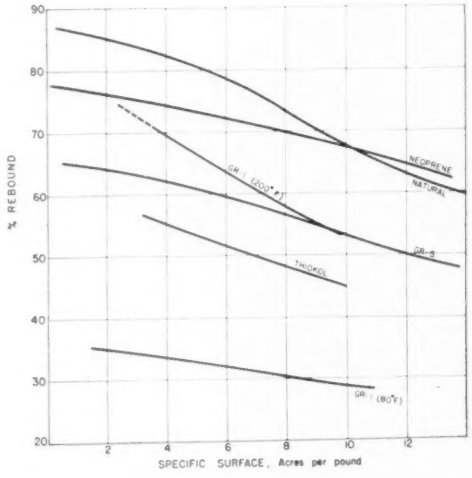

FIG. 4—Trends in rebound versus specific surface for natural and synthetic rubbers.

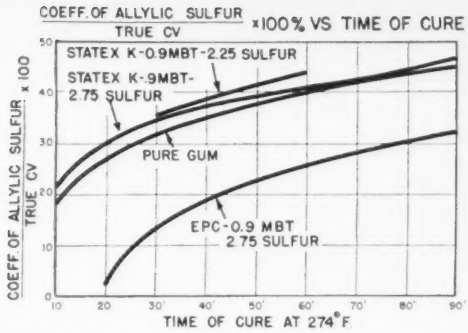
COEFF. OF ALLYLIC SULFUR / TRUE CV ×100% VS TIME OF CURE
STATEX K-0.9MBT-2.25 SULFUR
STATEX K-.9MBT-2.75 SULFUR
PURE GUM
EPC-0.9 MBT 2.75 SULFUR
COEFF. OF ALLYLIC SULFUR / TRUE CV x 100
TIME OF CURE AT 274°F

FIG. 5—Vulcanization differences between fine furnace and channel carbons.

foreshortens the stress-strain curve by reducing tensile as well as elongation, but in the non-crystallizable copolymers of butadiene with either styrene or acrylonitrile, extra modulus from the structure carbons is accompanied by extra tensile. No satisfactory explanation for this latter phenomenon is to hand although there is a temptation to assume that as the carbon fibers are aligned due to stretching of the rubber they act in a fashion similar to the crystals which form and strengthen the crystallizable polymers when they are stretched. The popularity of the structure carbons for the butadiene copolymers is thus understandable, especially since they also give better processing.

Crystallite Structure

At the risk of confusion through application of the same terminology to widely different phenomena, viz., crystallite or internal structure versus reticulate chain structure of carbon blacks, reference must be made to the work of Clark and his co-workers *(11)*. They were the first to examine a significant number of commercial carbons (66 in all). A condensation of the data is given in Table I for commercial rubber carbons.

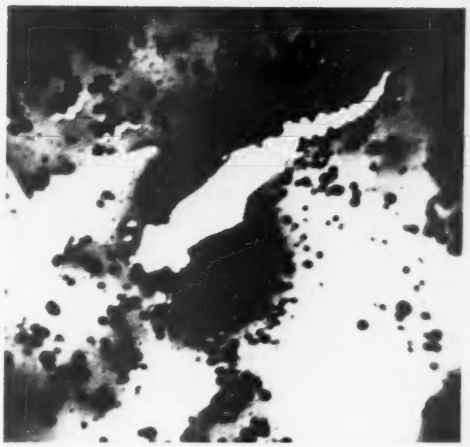

FIG. 6—Fine thermal carbon in cured GR-S. (X-20,000)

Basic Hexagon: There is no discernible trend in the dimensions of the basic hexagon with method of manufacture or rubber quality of carbon within any one type, with a single exception, viz., acetylene carbon. The basic hexagon of this carbon is distinctly different from that of the other rubber carbons and in fact comes close to graphite in its inter-planar spacing. It is also interesting to note that even protracted heating of MPC at high temperature failed to reduce the inter-planar spacing of this carbon.

Crystallite: There are some trends in data on the crystallite. Amongst the impingement blacks height is constant but width increases as fineness increases (EPC to HPC). This trend continues for impingement blacks into the still finer grades used for their jet black color. It is probable that this is the result of the progressively hotter flames as fineness of carbon black spheroid (not crystallite) increases. Harder processing in rubber

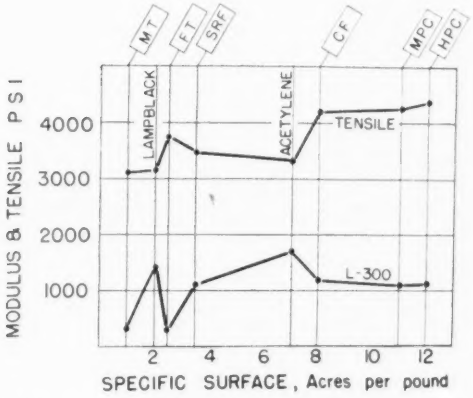

FIG. 7—Effect of carbon surface and structure in natural rubber.

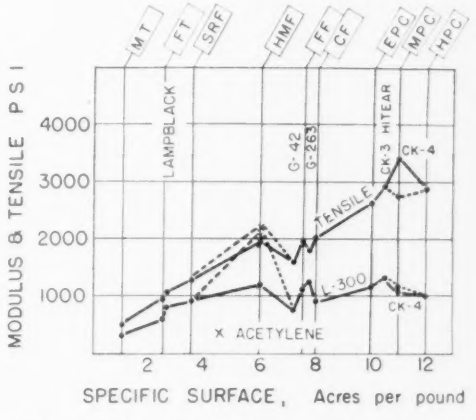

FIG. 8—Effect of carbon surface and structure in GR-S.

TABLE I—AVERAGE DIMENSIONS OF CARBON BLACK CRYSTALLITES BY X-RAY DIFFRACTION

Type of Carbon Black	Basic Hexagon		Crystallite		Shape Factor
	Height = c	Width = a	L_a = Width	L_c = Height	= L_a/L_c
Impingement					
HPC	7.190	2.483	27.8	13.9	2.00
MPC	7.230	2.478	21.1	13.2	1.62
EPC	7.143	2.488	16.7	13.5	1.24
Furnace					
Fine	7.305	2.480	17.4	12.9	1.34
SRF	7.205	2.507	19.9	14.3	1.39
Thermal					
Fine	7.075	2.465	30	17.3	1.73
Medium	7.075	2.480	34	15.9	2.18
Acetylene	6.790	2.450	34	24.6	1.38
Graphite	6.713	2.449	—	—	—
MPC heated 16 hrs. @ 1077° C.	7.205	2.445	22.8	12.4	1.84
MPC heated 45 hrs. @ 927° C.	7.305	2.460	33	15.0	2.20

(EPC to HPC) is due to greater specific surface of particle and not to wider and therefore flatter crystallites within the particles.

Crystallite width and difficulty of processing can scarcely be called cause and effect. The present state of knowledge of the carbon effect in rubber is too meager to permit any correlation between that effect and crystal structure within the carbon black particles. The thermal blacks and acetylene black have the largest crystallites and about the same size. Their social habits are exactly opposite in character. There does not therefore seem to be any correlation between crystallite size and tendency for reticulate chains of spheroids to form.

New Anomalies

By 1948 *(8)* it became apparent that the "Three Building Stones of Carbon Quality" represented an over-simplification of the problem. New anomalies are appearing. Of these, three only will be reviewed, i.e., roughness factor, unsaturation factor, and carbon gel.

Roughness Factor: Specific surface of carbons is usually calculated from diameter measurements in photomicrographs. This assumes a smooth surface but the particles, themselves, are so close to the limit of resolution of the electron microscope that this is not always a safe assumption. Thus, a number of investigators *(2, 15, 22)*, starting with Emmett, concluded from adsorption experiments that many carbons, particularly the very fine impingement carbons used for their jet black color, must have either porosity or some form of surface extension permitting the adsorption of more nitrogen or iodine than warranted by calculation of their surface from photographs.

By special heat treatments, carbons originally normal or smooth surfaced have in these laboratories had their surfaces so eroded that they gave as high as six times the adsorption expected from surface via diameters. In rubber these eroded carbons behaved as before treatment except for rate of cure. This type of surface extension is probably of no value for rubber reinforcement but can seriously affect rate of cure by adsorbing accelerator from the system. As yet no commercial advantage has been taken of this property. Most and in fact all commercial rubber carbons have a roughness factor of close to 100%, i.e., electron microscope and adsorption surfaces are the same.

Unsaturation Factor: This is a measure of the ethylenic bonds on the surface of the carbon black particle. It is most pronounced in oily blacks, i.e., with a high acetone extractable. Where iodine adsorption is used to determine unsaturation, supplementary tests are required to differentiate between high iodine adsorption due to roughness and that due to unsaturation. Stearns and Johnson *(23)* showed a positive correlation between unsaturation on the surface of the carbon black and reinforcement. They presented data for Graphon as the extreme with no reinforcement and no unsaturation.

This loss of reinforcing power by extreme calcination or annealing was announced by Anon in 1936 *(1)* who showed that Graphon type carbon or annealed carbon, as he called it then, had a lower modulus (L-400) than P-33 in both natural rubber and Duprene (the former name of neoprene). Defining unsaturation factor as the ratio of surface via iodine adsorption to the surface via nitrogen adsorption, Graphon, Furnex (SRF) and EPC carbons had factors of 111%, 97% and 93%, respectively, i.e., normal, whereas P-33 had a factor of 300% before extraction and 184% after acetone extraction. In spite of this, both P-33 and Graphon are low modulus blacks; P-33 with the highest unsaturation factor is a low modulus black, whereas EPC and Furnex, with lower or no unsaturation, are normal in modulus. Unfortunately, Stearns and Johnson did not have a thermal carbon in their study and so have no explanation of these anomalies to offer.

Carbon Gel: The third new example of anomalous behavior to be discussed is carbon gel formation. First announced from these laboratories by Sweitzer et al *(20)* in 1949, the carbon gel complex is now recognized as an essential factor in rubber reinforcement.

As shown in Figure 3 the normal carbons at 50 phr loading all give the same modulus in natural rubber. Structure index is the overriding factor in modulus build-up. This is further illustrated in Figure 9 taken from the Sweitzer paper. VFF and HAF carbons were known to have the same morphology and pH yet the latter gave more modulus in natural rubber. The same was true in standard GR-S and in cold rubber.

Bound rubber studies using the Fielding technique *(10)* showed that the carbon exhibiting the higher modulus (viz., HAF) insolubilized the greater amount of rubber. It also developed that increased mixing temperature raised the amount of rubber bound or insolubilized. This positive temperature coefficient made it difficult to accept Fielding's explanation of adsorptive forces as de-

pendent on carbon surface. For that reason the name of "carbon gel complex" was adopted. The commercial implications have been discussed in other publications from these laboratories *(7, 9, 21)*. Mixing temperature control has become another must for the mill room supervisor.

Progress on Carbon Gel Theory

Supporting Evidence: Electron photomicrographs by Ladd and Ladd *(18)* verified the physical entity of the complexes discussed above and serve to emphasize the nonhomogeneity of the final mixes. Because of the superior road wear performance of tires in which the carbon gel effect was deliberately enhanced *(9)* it seems patent that the ultimate in the way of particulate dispersion is not the optimum for rubber reinforcement.

It is the belief in these laboratories that somewhere during the best mixing process a dispersion approximating the particulate is attained. Evidence of this is seen in the very high electrical resistivity of well-mixed raw tread stock just prior to vulcanization, followed by an association or so-called flocculation of the carbon particles and sharp drop in electrical resistivity during the heating phase of vulcanization prior to the setting of the whole matrix by sulfur bonding.

This viewpoint is also held by Parkinson *(20)* who has demonstrated the reversibility of the dispersion and "catenation" phenomena by suitable mastication and heat treatments. He places the force producing catenation in the rubber phase and not a carbon particle to carbon particle attraction producing flocculation as pictured by Bulgin *(10)*. Somewhere in this process of dispersion and re-association of carbon particles the carbon gel complex is also formed.

Mechanism of Formation: As to the exact mechanism of carbon gel formation much remains to be learned. Indicative of the contradictory views on the subject, Polley et al *(21)* suggest "that in reinforcement, the association between rubber and carbon black is physical in nature and does not involve highly localized covalent cross-linking," while Stearns and Johnson *(23)* believe there is a chemical bond between the rubber molecules and olefinic type unsaturation on the surface of the carbon particles. These authors even go so far as to present the concept that "carbon black is chemically bound to the polymer mainly through sulfur bonds whereas the inorganic pigments are bound principally through van der Wals type forces. . . ."

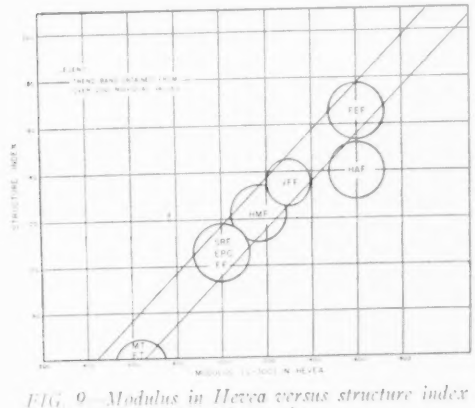

FIG. 9—Modulus in Hevea versus structure index for rubber carbons.

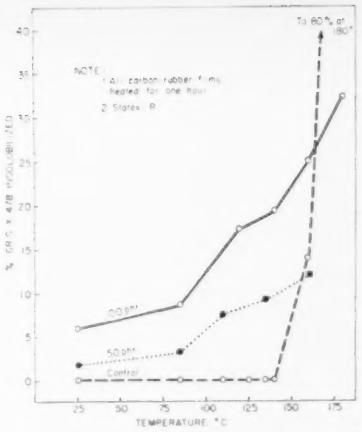

FIG. 10—Effect of temperature on adsorption of GR-S X-478 by carbon black (including temperatures of polymer gel formation).

This latter viewpoint seems, in the present state of knowledge, incompatible with the fact that road wear of LTP-VFF black treads increased 13% with an increase of 50°F. in processing temperature *(7)* of the LTP-black masterbatch two steps prior to sulfur incorporation.

Duke et al *(11)* also studied "the bound rubber-black complex formed by milling raw GR-S polymers and carbon blacks at several temperature levels." They found: (a) that as the quantity of black in the mixture was reduced the binding per unit of black increased, (b) that temperature of mixing has a large effect (on bound rubber), and (c) that "sorption (of black from dilute solution) and binding of the rubber by black during milling are not similar."

Carbon Black as an Antioxidant for Rubber: Sweitzer and Lyon *(27)* addressed themselves to the problem of resolving the difference in adsorption of rubber in dilute benzene solution and insolubilization of rubber by carbon in mill and Banbury mixing. They modified the usual adsorption test by evaporating the rubber-carbon mixture to dryness and then redissolving. They thus eliminated two disturbing effects, viz., solvent interference and the effects of shear in mill mixing.

By heating the dried films to temperatures through the range ordinarily encountered in factory mixing they found that above 135°C. (275°F.) the polymer gelled very rapidly just as was the case with mill sheeted polymers heated statically in the oven. Also, by heating the carbon-cold rubber films cast from solution they now got an increase in bound or insolubilized rubber over the unpigmented control at temperatures below about 150°C. (325°F.) and less rubber insolubilized in the presence of carbon than in the unpigmented control at higher temperature, as shown in Figure 10.

This apparent contradiction of gel promotion and repression was resolved by experiments in which oxidative scission was deliberately promoted and then inhibited by use of a nitrogen atmosphere. LTP, when heated in air at temperatures between 100 and 140°C., breaks down through oxidative scission. When heated in an atmosphere of commercial nitrogen there is gelation due no

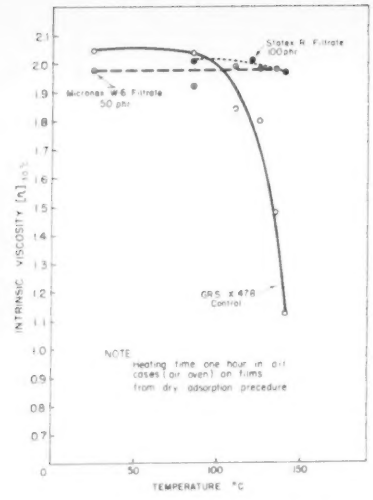

FIG. 11. Effect of heating in air on intrinsic viscosity of polymer and carbon-rubber films.

doubt to the presence of traces of oxygen in the commercial grade of nitrogen. It is generally conceded that gelation requires some small amount of oxygen and that scission occurs when more is present.

It is assumed then that the carbon black adsorbs, selectively, the oxidative intermediates which at temperatures between 75°C and 150°C. (see Figure 11) cause scission. In so doing they also hold or bind the polymer chains at these points of incipient scission, and hence promote carbon gel formation in the temperature range where no polymer gel would form. Likewise, at higher temperatures, it continues to adsorb the intermediates which normally form polymer gel and so represses polymer gel formation. In this sense carbon black may properly be regarded as an antioxidant for the rubber.

No satisfactory explanation is at hand to explain identical gel repression effects for channel black with high oxygen volatile and an acid pH, and P-33 with no oxygen volatile and a high pH, nor to explain the differences in gel-forming behaviors of carbons of the same morphology and pH (VFF and HAF)—to mention just two unanswered questions.

Hevea-Carbon Gel: The carbon gel idea has been carried through into natural rubber to advantage. In natural rubber, however, an extra step is required to develop the optimum carbon gel. A little over a year ago Columbian Laboratories announced the successful exploitation of the carbon gel idea with natural rubber *(6)*. Starting with the same technique employed with cold rubber it was soon found that with the natural polymer a new step had to be added, viz., the hot mixing of the black master at a higher than 50% black to rubber ratio and then cutting back to that of the final compound with new rubber in a second pass through the Banbury.

The same modulus, rebound, flex life and wear improvements occurred through deliberate gel enhancement in natural rubber as had been proven in LTP. In fact, on the road, the Hevea-carbon gel tread outwore an LTP carbon gel tread by about 5% whereas by normal mixing procedures the relative ratings are in the opposite direction. The modest enhancement of physical properties by hot milling alone quoted in the reference *(6)* was confirmed by Drogin et al *(13)*, but these investigators did not employ the step of high black concentration in the original hot mixed master and so failed to take full advantage of the phenomenon.

These experiments were reminiscent of the work with natural rubber described by Gerke et al *(11)* and by Bradley *(1)*. Gerke and his associates, using very hot rolls, milled in and milled out a carbon black scorch, to use mill room language. They worked chiefly with normal (45 to 50%) ratios of channel black to Hevea in their masterbatch. Bradley used somewhat higher ratios of black in his masterbatches but obtained his "scorch" by heating the master statically at high temperature and then remilling with or without the addition of new rubber, depending on the ratio of black phr in the original master. He showed micrographs demonstrating a two-phase system, viz., areas of high black concentration floating in a matrix of lower black concentration.

Both Gerke and Bradley claimed enhanced road wear and both showed electrical resistivities up in the range of the pure polymer, a result compatible with Bradley's pic-

TABLE II. THE PRIMARY PROPERTIES (APPROXIMATE) OF THE RUBBER CARBONS

Raw Material	Natural Gas		Gas or Gas + Oil	Oil	
Process	"Thermal"	Channel	Furnace	Furnace	L-Black
Carbon Types	MT, FT	EPC, MPC, HPC	SRF, HMF, FF, VFF	FEF, HAF	RMV
Columbian Grades		Micronex's	Furn. Statex 93, B, K	Statex M, R	LB No. 18
Surface, acres/lb	1, 2	10, 11, 12	3½, 5, 7, 9	5, 11	2½
Surface, M^2/g	9, 18	89, 98, 107	31, 45, 63, 80	45, 98	22
Diameter, mμ	300, 150	30, 27, 25	80, 60, 40, 35	60, 28	100
Oil Absorption	low	normal	normal to sl. high	high	v. high
Structure Index	60	100	110, 120, 100, 130	180, 150	200
pH effect	sl. alkaline	acid	alkaline	alkaline	acid
pH range	7-8	4-5	8-10	8-10	3-4
Atmosphere	v. reducing	oxidizing	neut. to reducing	neut. to red.	oxidizing
Oxy. Volatile	below 0.5%	5%	below 1%	below 1%	2%
Alkali Adsorption	low	medium	low	low	medium
Oil Vol. (Ext.)	above 1%	0	0.05-0.2%	0.05-0.2%	0.5%
Roughness Factor	below 100	100	100	100	100
Unsat'n. Factor	pronounced	none	slight to none	none	none
Ash	v. low	v. low	0.2-1.0%	0.2-1.0%	low

TABLE III—CARBON BLACK USES IN RUBBER

Where Used	Which Used	Why Used
Passenger Tire Treads	10-12 acre carbons, normal & high structure	For maximum reinforcement, i.e., tensile with good modulus
Truck Tire Treads	8-10 acre carbons	For balance between heat build-up and wear, good flex
Undertreads & Sidewalls	5-7 acre carbons with structure, high pH	Smooth processing, hardness & low hysteresis, good flex
Outer Carcass Plies	5-8 acre carbons, normal & high structure	Good tear, low heat build-up, proper hardness step-down, good flex
Inner Carcass Plies	3-5 acre carbons, normal & high structure	Modest reinforcement with minimum hysteresis, good flex
Inner Tubes, Natural	Thermal or 5-8 acre furnace carbons	Good tear, fast cure, good aging, low hysteresis
Inner Tubes, Butyl	5 acre, high structure	Good processing, good modulus
Tank Trucks & Bogey Rollers	5-8 acre high pH carbons, normal & high structure	Best balance between tear, hardness & hysteresis
Conveyor Belts	8-12 acre carbons	For maximum reinforcement, cut resistance & flex life
Power Belts & V-Belts	8-10 acre carbons, normal & high structure	Good balance between wear, flex & hysteresis, w- or w.o. electrical conductivity
Wire Jackets	8-12 acre carbons	For toughness, cut resistance
Wire Insulation, High Tension	10-12 acre carbons	For clean-up of electrolytes to improve resistivity
Wire Outer Cover, High Tension	5-12 acre, high structure, high pH	For control of corona & ozone resistance
Hoses	3-12 acre	
Gaskets & Diaphragms	3-7 acre carbons, usually high structure & high pH	For hardness, snap & low compression, good aging
Footwear	3-8 acre carbons, high pH	For tear, wear, flex & good aging with fast cure
Automotive Parts	3-8 acre carbons, high pH & high structure	Superior extrusion for pan cured goods, good aging & resilience

ture of a two-phase system or the description of Gerke of particulate dispersion of black in rubber which persists through vulcanization. In contrast, the Columbian method of consciously enhancing the carbon gel effect has little or no effect on electrical resistivity over that occurring with conventional mixing, suggesting an intensification of the rubber-carbon bond rather than a change in spacial disposition of the carbon black.

Carbon Types and Processes

By way of review, Table II gives a synoptic picture of today's carbon blacks from the point of view of raw material, process of manufacture, types and approximate basic properties. It will be noted that the carbons are separated into three groups, natural gas being used exclusively in the first group, gas being the primary carbon source in the second, while oil is the primary or exclusive carbon source in the third. The significance of the various properties shown will be discussed below.

Diameter and Surface: These properties provide a measure of fineness as determined by the electron microscope. It is economics that determines the best process for a specific fineness.

Oil Absorption and Structure Index: These properties provide a measure of the structure habit of particles, low oil absorption indicating little chain structure, high oil absorption, a significant chain structure. Structure index is a useful factor for expressing degree of structure, obtained by arbitrarily taking the value for channel carbons as 100.

Atmosphere: The atmosphere in which the carbon particles are formed determines largely their surface chemistry, for example their pH and adsorption properties. In furnace processes the atmosphere at birth (of carbon particle) is slightly oxidizing but becomes reducing during final formative stages of the carbon particles.

pH: Acid pH results from oxidative nature of process atmosphere and is a measure of oxygen volatile present and of curing rate in rubber. Alkaline pH is largely due to the spray salts present (see Ash in table), with pH of pure carbon lying in the range of 6 to 8.

Surface Characteristics: Roughness factor is a measure of particle surface pitting; normally there is little pitting since operations are run to avoid excess pitting. Unsaturation factor is a measure of the ethylenic bonds on the surface and is pronounced in the oily carbons made in reducing atmosphere. Oil volatile is a measure of traces of high MW soluble hydrocarbon left on the surface.

The primary properties outlined above all play a significant role in the properties (secondary) of carbon compounds, whether rubber, paint, ink or the other multitudinous products into which carbon enters. In rubber compounds, increased fineness is usually associated with higher tensile, structure with modulus, and pH with cure. Roughness factor and the other primary properties can also play a significant role, often unfavorable, if their magnitude is not kept within "safe" limits.

Selection for Application

As pointed out above (see Figures 2 and 3), the overriding element of carbon quality contributing to reinforcement is fineness or, more precisely, specific surface. Not all applications demand the utmost in toughening, and the choice of carbon for a particular application is therefore based on three considerations: (a) the amount of reinforcement governed chiefly by surface; (b) the secondary effects, viz., resilience or inversely hysteresis, hardness, tear and processing, governed by surface, structure, pH, and gel-forming power, and (c) cost, i.e., the cheapest carbon that will do the job. Some of the principal applications of carbons, the grades used and the special reasons for their use apart from reinforcement and the reasons for their selection are summarized in Table III.

Since tire treads take more carbon black than any

other single item of manufacture some special mention is warranted. For natural rubber heavy-duty treads, channel black is still preferred because of safe, i.e., scorch-free, processing. The fine, high structure carbons have certain advantages, viz., good crack resistance and wear, but in most instances processing is still the stumbling block. Various expedients are used to attain safe processing, such as reduced black loading; reduced curative, either sulfur or accelerator; extra softener; cure or scorch retardants. Most of these expedients cost wear but, depending on the application, this compromise may be advisable.

Summary

The rate of growth of the carbon black industry since the birth of the carbon reinforced rubber tire has exceeded that of the allied industries, viz., automotive, pneumatic tire and rubber. Today's motorists accept the black tire tread without question and with no knowledge of the miracle by which carbon black makes a tough traction surface out of a soft stretchy natural rubber or utterly transforms a short weak, brittle synthetic elastomer into an equally good or better tire tread.

Until about 10 years ago the fact of reinforcement was accepted and exploited. Empirical knowledge was characteristically slow in accumulating. The electron microscope lifted the veil of carbon black's closely guarded secret. The "Three Building Stones of Carbon Quality"—surface, pH and structure—rationalized the empiricisms of thirty years of tire compounding. Carbon black technology moved from the qualitative to the quantitative.

The study of the variables affecting the degree of reinforcement of rubber by carbon has made for more intelligent use of carbon black and the development of new and better types tailored to specific applications. The carbon effect in rubber may now be re-christened the carbon gel complex effect. Variables affecting the degree of its development bring closer an understanding of its mechanism.

ACKNOWLEDGMENT

The author gratefully acknowledges the helpful criticisms of Mr. W. B. Wiegand, vice-president of the Columbian Carbon Company.

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Gray Co., Inc., of Minneapolis, Minn., has introduced a new heavy-duty painting unit featuring an extra powerful, air-operated pump for easily handling in volume the new type coatings, extremely heavy paints, and many other fluids. The circulating system in the new unit delivers paint directly to the spray head and back through the supply lines, thus reducing aeration to a minimum and thereby eliminating bubbles and pinholes in the finished surface.

A proportioning indicating pyrometric controller in the same price range as regular off-on indicating controllers is now being manufactured by the Taco West Corp., 525 North Noble St., Chicago, Ill. Called the Model JP Guardsman Proportioning Controller, the unit automatically adjusts the ratio of power "on" and "off" over a given time cycle to maintain any desired temperature set with the index pointer. It is available in 36 standard scale and thermocouple ranges.

Extraction Operations in the Processing of Rubber

By L. F. STREET

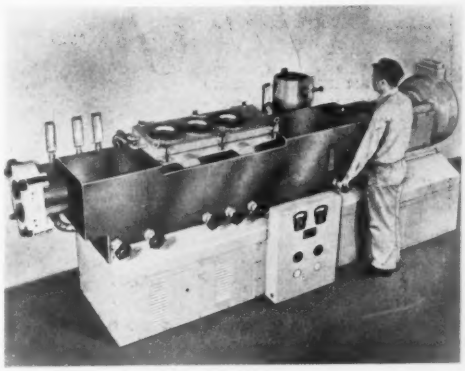
Research and Development Engineer, Welding Engineers, Inc., Norristown, Penna.

IN the processing of Butyl rubber, Vistanex and many other rubbers, as well as thermoplastic materials, the performance of an extraction operation is often essential and rather difficult to perfect. Considerable work has been done with Welding Engineers' Compounder-Extruder on operations of this type and, on many materials, results are successful. The equipment is of a design that gives a continuous automatic processing of the material with the generation of heat in the material during the course of the processing. Vacuum can be applied to the material for the purpose of extraction if required.

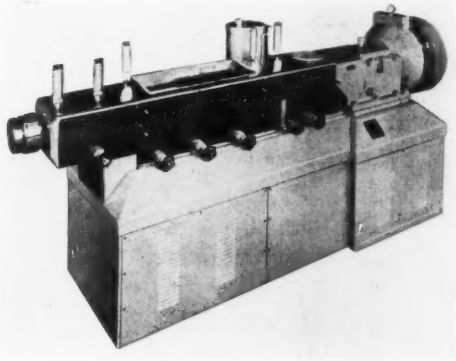
The apparatus is an extruder type machine of double worm construction. The two worms lie side by side in a barrel having a figure 8 cross-section, and there is an opening in the casing where the peripheries of the two worms are adjacent. The hopper opening, of course, is at the rear end of the barrel casing of the machine. There is an open section in the top of the barrel, approximately in the middle of the machine, where the worms are exposed to the atmosphere. Material passes through this open section on its way to the die. The barrel of the machine is long for a given worm diameter. For example, in a machine with two 2-inch diameter worms, the barrel housing is approximately 50 inches long; in a machine with two 4½-inch diameter worms, the barrel is approximately 9½ feet long. The hopper opening in the machine is normally a round tube, large enough so that the maximum diameter almost completely spans the two worms. For instance, an 8-inch pipe size is used in a 4½-inch machine.

As the material is fed to the machine, it is seized by the two worms and advanced in the barrel casing. The worms, in this section of the machine, are designed to do considerable mechanical work on the material by kneading it under high pressure as it is advanced along the barrel. The action of the worms, in seizing the material in the hopper and in generating pressure on it as it moves forward along the barrel, starts the elimination of the free gases and liquids that may have been fed into the machine with the material. Gases can escape back up the hopper of the machine while liquids must have a suitable provision made for their drainage out of the back end of the barrel. Dissolved fluids, of course, do not respond to the action of the machine at this point and continue on through with the material in addition to a certain amount of free fluids which have not been expelled in the back portion of the machine. By the time the material reaches the open section in the middle of the machine, it has been thoroughly worked and its temperature raised considerably. The amount of this rise can be controlled by varying the jacket temperatures of the machine, the design of the worms, or their speed of rotation.

The product temperature, of course, must be determined by a consideration of the heat stability of the material as well as the temperature necessary to drive off the ingredient being extracted. After the material has been brought to this condition while passing through the rear half of the machine, it enters the open section in which it is still agitated and kneaded by the worms, exposing continually new surfaces of material to the atmosphere or to a vacuum. It is in this area that the remainder of the free fluids are driven off and the dissolved or suspended ingredients are vaporized by high temperatures and, if necessary, low pressures. At the present time, it is considered that an absolute pressure of



View of the Model 1552-B Compounder-Extruder, having a long open extraction section equipped with vacuum attachments. Note the three windows in the extraction dome, which are provided for the purpose of observation by the operator.



View of the Model 3552-B Compounder-Extruder, equipped with open section for extraction purposes. This unit was built to function without vacuum attachment; volatiles were merely flashed off to the atmosphere.

10 mm. is entirely feasible for commercial operation and laboratory runs have been made at less than 2 mm. provided the volume of vapor is not too great.

The worms move the material through the extraction section and into the enclosed portion of the barrel at the front end of the machine. Normally, one worm terminates part way into the enclosed portion of the barrel and the other worm continues up to the die. The material being carried by the shorter worm is transferred to the long worm. At the die, the material is extruded into the desired shape, such as strands for cutting into pellets, a flat ribbon for packaging or, in some cases, a desired shape of finished extrusion for use.

In the processing of Butyl rubber, the material has been fedato the machine in a coagulated state with a considerable amount of free water included. The operation takes place, as described above, with much of the water draining out of the back of the machine and the balance being vaporized in the open section. Typical results in recent tests have produced 142 lbs./hr. of material at 110 rpm of the worm on a Model 2052 machine (2-inch diameter screws). The material produced had less than .5% moisture at the die and this dropped somewhat further as the material stood. The machine was drawing about 12 hp to perform this operation.

A similar type of operation, the degassing of polyisobutylene, has resulted in the continuous processing of the material automatically and the production of finished commercial material with a very short elapsed time between the generation and packaging of the product. In this case also, no vacuum has been required.

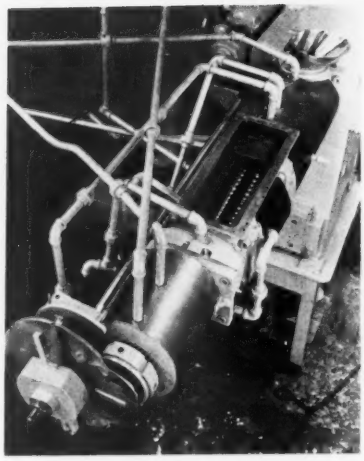
Numerous operations have been conducted on thermoplastic materials; cellulosics are being dried during the course of their processing and compounding, with and without the use of vacuum. Test runs have been made on other types of plastics requiring temperatures of 320° C. and pressures of 2½ mm. for successful extraction.

The outstanding features of Welding Engineers' Compounder-Extractor-Extruder are as follows:

1. Its continuous operation without the need for manual handling of the material.

2. Its ability to do an efficient and rapid extraction job in the lower ranges of volatile content at high throughput rates.

3. Its ability to deliver the product in a form suitable for packaging or use without the performance of an additional operation.



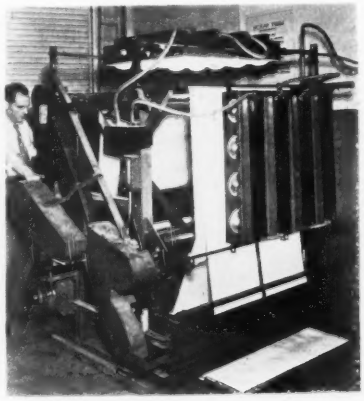
An idea as to what the open section of the Compounder-Extruder looks like is provided in this view of a Model 2052-B laboratory unit. Note the two worms exposed to the atmosphere or to vacuum.

Drying Rubber Cement on Top Stock with Infrared

RUBBER cement is being dried on top stock (principally for volley balls) in 18 seconds at the plant of the W. J. Voit Rubber Co. in Los Angeles, Calif. Two separate rolls of the top stock, each approximately 18 inches wide, are handled at one time on the machine shown in the accompanying illustration. The material moves at a speed of 15 feet per minute. The stock passes over steel rollers against a reinforcing canvas belt. The cement is applied continuously to one side of the stock as it passes over the coating roller at the bottom of the machine. After it passes in front of the infrared and is dried it is removed.

Before installing the infrared unit, the coating of the top stock for a day's production, plus the subsequent drying of the rubber cement, required six employees, three each on a two-shift day. Stock had to be cut into squares, hand coated with cement with a brush, and placed on a conveyor with travel slowed to permit a 10 to 15 minute air dry cycle. The infrared unit illustrated produces in four hours all of the stock required for a day's production, with only one attendant required for the operation. The unit, supplied by the Fostoria Pressed Steel Corp., Fostoria, Ohio, uses eight sections.

In addition to this application, Voit Rubber is using infrared equipment to dry rubber cement in 30 seconds on the two halves of rubber sections of tennis balls before cementing together; on the outside of the tennis balls prior to applying the felt covers, and for drying cement on the halves of patented rubber valves.



Rubber cement is dried on top stock in 18 seconds at the Voit Rubber plant with this infrared unit.

Editorials . . . . . .

Purchasing T. C. Rubber

AN EDITORIAL in our July, 1951, issue called attention to the fact that a concerted effort is being made by natural rubber producers, through the services of the International Rubber Research Board, to enable American rubber manufacturers to properly evaluate technically classified (T.C.) natural rubber. It will be recalled that we urged both large and small manufacturers to secure a sample lot of such rubber and make their own evaluations, since it was to their own ultimate advantage. We are glad to report that a fairly respectable number of manufacturers have been making such evaluations.

It is evident, however, that there seems to be a considerable amount of misunderstanding regarding the purpose of T.C. rubber and the procedure to follow to obtain the greatest advantage from its use. The distribution of the first lots received in this country indicates that the buyers are purchasing "particular marks," which is not the intention of the producers in the current stage of the development of T.C. rubber.

As indicated in our previous editorial on the subject, technically classified rubber has been officially defined as follows: "Technically Classified Natural Rubbers are those for which the normal market classification is supplemented by the additional information obtained from tests carried out on the freshly prepared rubber. The rubber so classified is identifiable by special marks on the bales." These special marks include lines, circles and/or crosses in various colors, each mark carrying a significant interpretation.

The technical class with which a production lot (usually one day's production) is identified is determined by testing a sample which is made up of a blend of samples taken from representative bales of the lot. As indicated by Newton and others [*Ind. Eng. Chem.*, Vol. 43, p. 329 (1951)], some variability of properties occurs within a day's production of an individual estate, but this variability is small compared to what is found between estates or between seasons. The production lot will normally include bales having properties which spread over a range which may or may not be wider than the limits of one technical class.

A shipment of Technically Classified Natural Rubber to this country, though made up of only one RMA grade, will normally contain several estate production lots and will therefore usually have several technical classes. It is not possible to properly evaluate these classes of T.C. rubber by sampling or using only one or two bales of each class. The natural rubber interests believe that the proper method of evaluating T.C. rubber is to carry out a factory run in which observations on uniformity of behavior during processing, rate of cure, proportion of rejects, etc., are made.

The amount of rubber required to give a valid conclusion will depend, among other things, on the article produced, but in general a considerable number of bales may have to be used before the specific advantages of T.C. rubber become apparent. In other words, if the manufacturer wants to secure a significant result from T.C. rubber, he will have to test many bales and compare the spread of values with that from randomly selected unmarked bales.

To sum up, the advantages of Technically Classified Natural Rubber can best be determined by the individual rubber manufacturer if he does not use particular marks as his buying guide, but rather if he purchases a lot, on the basis of its RMA grade, which has been technically classified.

Extended Controls

THE recommendations made by President Truman to extend government controls over GR-S production and distribution for another two years, as reported in detail elsewhere in this issue, comes as no surprise to the industry and especially to the readers of these pages. Several times in the past year we have stated that there was very little likelihood of the synthetic rubber plants being turned over to private industry as long as the "emergency" lasts. The recommendation that the Butyl rubber plants be so disposed was also more or less expected. We will go further at this point and predict that the Butyl rubber plants will also remain in government hands for at least another two years, although a deal may be made with private industry for the construction and operation of additional facilities.

NEWS OF THE MONTH

GOVERNMENT OWNERSHIP OF SYNTHETIC PLANTS FOR TWO MORE YEARS RECOMMENDED BY TRUMAN

PRESIDENT Truman, on January 14, asked Congress to extend for two years the government's authority to own and operate general purpose synthetic rubber plants. He also recommended that Congress give consideration to the disposal of the Butyl rubber plants owned by the government. Moreover, he suggested that efforts be made to encourage private capital to construct additional plants for the production of Butyl. Only two Butyl plants are presently owned by the government, as opposed to the 26 plants in the GR-S program. Of these, 13 actually produce GR-S, while 10 produce butadiene, and 1 turns out styrene. There is also 1 chemical plant and a laboratory at Akron. Mr. Truman stated that each Butyl plant is "highly integrated" and that disposal should involve no significant interference with plant operation. In the case of GR-S, he said, inasmuch as some plants produce components for others, disposal to private industry might present problems. Efficiencies resulting from integration under the government, he stated, could probably not be maintained fully if the plants were owned by a number of independent companies.

Another reason for disposing of the Butyl plants, Mr. Truman said, is the fact that demand for this type of rubber is considerably above the capacity of present plants and construction of more plants is desirable. Private industry, however, is reluctant to build more plants now, when it means entering into competition with the government which operates on a "no profit-no loss" basis.

Although not mentioned in his message to Congress, President Truman is reported ready to ask Congress to let the government build more Butyl plants if his recommendation for disposal to industry is not followed.

Existing rubber legislation requires that the President report to Congress his recommendations for disposal of the synthetic plants owned by the government. These recommendations must be presented to Congress six months before the expiration date of the law. Current legislation expires on June 30, 1952. Industry sources have indicated that there is little doubt that the GR-S plants will remain in government hands under new legislation. The main question will be whether Congress follows the President's recommendation on the Butyl plants.

The legislation will go to the Armed Services Committees in both branches of Congress. In the Senate, the rubber subcommittee is headed by Senator Lyndon Johnson (Dem., Tex.), long an advocate of strict government control over synthetic rubber during the emergency. It was Senator Johnson's Preparedness Subcommittee that made the recommendation last spring leading to exclusive government buying of natural rubber.

President Truman's message also indicated that the stockpile goal for natural rubber is nearing attainment. There have been some reports that natural rubber purchasing may be returned to private industry some time this spring or summer.

At present, natural rubber is selling at approximately 50c a pound, compared with 26c for GR-S. Mr. Truman, however, said one of his reasons for recommending continued government ownership of GR-S plants is that the synthetic could not compete for bulk uses with natural rubber offered at significantly lower prices over a considerable period of time.

The implication, he added, is that the government might have to support GR-S production for security purposes in the event of a sharp decline in natural rubber prices. Before Korea, natural rubber was selling at less than 25c a pound.

Mr. Truman said it is still his belief that the government should have the authority to dispose of the GR-S plants. But he made it clear that no such disposal would be likely for the next two years, and so he merely asked Congress to extend the existing law for that period.

The President's message was not accompanied by a detailed analysis, as was his 1950 message which led to the present extension of rubber legislation. The reason, apparently, was that Mr. Truman considered the disposal problem would not come up, and that if it did, the government's previous proposals were still good.

Humphreys Urges Leasing

H. E. Humphreys, Jr., president of the U. S. Rubber Co., in a statement on January 30, urged the government to lease its GR-S plants to private industry as a first step toward eventual sale of the plants to private operators. Recommending inclusion of feed-stock facilities, Mr. Humphreys declared that he shares the same belief which prompted Congress to declare in the original Rubber Act of 1948 that the security interests of the United States will best be served by the development of a free, competitive enterprise.

Mr. Humphreys also recommended that the Rubber Act be amended to give the government authority to sell the plants to qualified operators and that it be extended for a maximum of one year to June 30, 1953. At that time, the offer to sell would be subject to immediate acceptance. "In my opinion," Mr. Humphreys declared, "there is now no problem of national security stemming from the rubber situation."

Conversely, he stated that the United States will have more rubber in 1952 than it will know what to do with. Estimating that United States consumption will approximate 1,400,000 tons of natural and synthetic rubber in 1952, he judged that the nation will have about a 250,000-ton surplus.

Weighs Tire Plant Expansion

Another interesting note has come from the Defense Production Administration which is expected to rule shortly on whether to approve a $30,000,000 tire plant expansion program. This figure represents less than a third of what the industry has been seeking. The $30,000,000 figure has been recommended to the DPA Office of Programs and Requirements by the NPA Rubber Division and covers only heavy-duty truck and airplane tires.

Tire manufacturers have filed applications for a rapid tax write-off on $100,000,000 of new tire facilities they would like to build, much of it reportedly to include passenger car tires. NPA said the scaled-down program it has recommended provides for a "substantial number of heavy-duty truck and airplane tires." No passenger or light-duty truck tire expansion was approved.

The recommendation is the result of a comprehensive survey of the industry's tire manufacturing facilities made by the NPA Rubber Division last year. The $100,000,000 in applications for tax amortization benefits for new tire plants has accumulated since the start of the current mobilization program. No tire facility plant expansion has been approved since the Korean outbreak other than one Certificate of Necessity which was granted involving a proposed investment of $106,000,000. Of this sum, DPA approved 75.5%.

or $80,000. Much of the expansion, however, has already been started without prior guarantee of government tax benefits.

U.S. Buys British Stocks

As a further indication of the growth of the natural rubber stockpile in the United States, as mentioned by the President, the General Services Administration has announced that arrangements have been completed for the transfer of 25,000 tons of natural rubber from strategic stocks of the United Kingdom to the U. S. stockpile. The transfer will take place over the forthcoming months, with payment to be on the basis of present American buying prices.

Jess Larson, Administrator of GSA, said that these operations will be of advantage to both countries. They will bring early benefit to the balance of payments of the Sterling area, he said, and will accelerate the building up of strategic stocks in the United States. Mr. Larson added that the transfer will in no way affect the procurements for strategic stocks which the governments otherwise would have made. However, it is expected to strengthen the chances of an early withdrawal by the government as natural rubber buyer for industry.

The announcement by GSA of the purchase of the British rubber followed closely a reduction in the price of natural rubber sold by the government to industry. The new price is 50½c a pound for February and March deliveries. This is the second price drop announced since GSA took over the exclusive procurement authority for rubber in December, 1950, when it set the figure at 66c. On June 21, 1951, GSA lowered the price to 52c. The most recent price drop was dated January 17.

Mr. Larson said the latest price drop was "another dividend to the rubber consumer brought about by the government's policy of passing along price reductions it has been able to effect by acting as sole American representative, for industry and stockpiling, in the market."

While no date has been set for eventual withdrawal by GSA as exclusive buyer, Mr. Larson pointed to his previous statements in which he said such action would take place in the "foreseeable future." Mr. Larson stated that while a definite time cannot as yet be set, procurements both for stockpiling and industry have been proceeding at a satisfactory rate. If the situation does not change for the worse, he said, GSA may be able to make a further announcement by the beginning of the second quarter.

OPS Consulted On Move

The announcement by GSA of a drop in the price of natural rubber was made after consultation with the Office of Price Stabilization. This latter agency has stated that it has no plans for requiring manufacturers to pass on the lower price of natural rubber. It pointed out, however, that sales of tires to private brand owners as well as tire mileage contracts are pegged to the costs of rubber.

Industry spokesmen in Akron stated that the price reduction was too small to have any effect on the retail prices of tires and other products. One rubber spokesman stated that any price reduction which might be made will be very nominal and limited in scope. He reasoned that synthetic rubber is now taking the lion's share in the production of thousands of products made from rubber, and will continue to do so because of the price differential. However, one line of products that might benefit from the reduction, and industry people emphasize the word "might," is heavy-duty truck tires where the bulk of natural ruber is now going.

Natural Price Reaction

As a result of the price drop in natural rubber announced by GSA, primary market prices for natural rubber may be depressed. Rubber dealers believe that the selling price reduction will induce foreign shippers to bring their offers down to the current GSA buying price.

Far Eastern shippers reacted in just such a manner when GSA reduced its selling price from 66c to 52c last June, although it took more than a month before they would meet the lower price level. The big question in rubber trade circles is whether GSA will cut its buying price still further when and if foreign sellers meet the current price.

Rubber producers in the Far East have been re-examining their position in the light of current developments in the United States. Sir John Hay, managing director of Guthrie & Co., which owns and operates one of Malaya's largest rubber estates, stated that the Malayan economy may be hard hit this year unless the United States relaxes its restrictions on the use of natural rubber.

Sir John noted that stockpiling in the United States is likely to decline or even cease during 1952. He expressed the hope that the United States will see the wisdom of modifying restrictions on the use of natural instead of boosting the production of synthetic. Malaya's economy, he said, depends on rubber, and he thinks it politically desirable for the free world to keep that country on a sound economic basis.

The political implications cited by Sir John were recently elaborated upon by Lt. General Edward M. Almond, commander of the Army War College at Carlisle Barracks, Penna., who stated in a recent address before a meeting of editors in Virginia, that one of the world's greatest danger spots is the natural rubber producing area of the Far East.

Many of the countries in the Far East, he said, are economically deficient, politically confused, psychologically disturbed, socially degenerating and politically drifting. He noted that this area supplies 90% of the world's natural rubber.

The crisis in the Far East was further elaborated upon in other news reaching this country. According to these advices, Red China is now receiving natural rubber from Ceylon. Partly for profit and partly to appease its "leftist" politicians, Ceylon is supplying China directly and through Poland.

By selling openly to Red China, Ceylon has forfeited American Point 4 aid, ignored a world-wide plea by the United Nations that Red China be deprived of rubber, and jeopardized its own candidacy for UN membership. The latest shipment to go from Ceylon to Red China was transported in a Polish freighter at a price said to be 5c above the current world market.

Remove GR-S Inventory Limits

In Amendment 1 to Order M-2 dated February 4, NPA removed inventory limits on GR-S and increased by 20% the amount of high tenacity rayon that rubber manufacturers may use. The action was taken under the stated policy to decontrol any defense material whenever improvements in supply make such action possible, NPA said. A boost in RFC stocks from 20,000 tons in June, 1951, to about 42,000 tons at present, resulted in the February 4th order, the government agency explained.

Inventory control over GR-S is now limited to the provisions of NPA Regulation 1, which require that inventories be held to a practical minimum working level. The amendment did not change export restrictions or the 46% limitation on the amount of "cold" as compared with "hot" GR-S which may be purchased from the RFC.

Smaller rubber manufacturers will now be able to buy GR-S in carload lots without working inventories to abnormally low levels, NPA said. These firms will benefit through the elimination of extra freight charges on less-than-carload lots, and the change will allow more efficient manufacturing, warehousing and shipping of GR-S by RFC.

As to the increased amount of high tenacity rayon which the industry may use, higher production is said to be the reason for the easing of controls. Production is expected to reach 400,000,000 pounds annually by April, 1952, as com-

Interprets Crepe Order

A natural rubber crepe sole which has not been compounded, vulcanized or attached to a shoe is still natural rubber and therefore cannot be privately imported, NPA announced on January 23 in an interpretation to Order M-2. The interpretation applies to Section 4 of the order which prohibits the private importation of natural rubber [as defined in Section 3 (a)] except as specifically authorized in writing by the General Services Administrator. Crepe rubber, according to the interpretation, is one of the forms and types of tree, vine or shrub rubber and is, therefore, natural rubber. The mere cutting of natural rubber crepe in the form and shape of a shoe sole does not substantially alter its character, and therefore it cannot be removed from the category of natural rubber, NPA said.

pared to the 325,000,000 million pound rate last July.

Military requirements for high tenacity rayon have been smaller than expected, NPA stated. New capacity and conversion of textile rayon facilities had been expected only to meet these requirements. The increase for rubber manufacturers was permitted by changing the base period from the average of the first two quarters of 1951 to the second quarter alone. The percentage of the new base period usage was increased from 100% to 120%. The distinction between civilian and military production was also eliminated in computing base period usage.

The second quarter was established as the base period because usage of the high tenacity rayon was more representative of industry-wide operations during that period, NPA declared.

During the newly-established base period, the rubber industry used about 79,000,000 pounds of high tenacity rayon. The industry will have available about 91,000,000 pounds, 98% of production, during the first quarter of 1952, NPA said.

Synthetic Gains May Hold

In commenting on the gains made by synthetic rubber since the Korean outbreak, officials of the Dayton Rubber Co. have expressed a doubt that these gains will ever be given up to the natural product. Despite the fact that the industry had to be forced into large-scale substitution of synthetic rubber, it now finds that an operation geared to wholesale utilization of that commodity is not such a bitter pill after all, officials of Dayton Rubber declared.

Furthermore, rubber manufacturers have become so used to synthetic that operations would suffer from a change back to natural. Joseph Rockoff, vice-president in charge of development for Dayton, indicated that the industry would suffer a 30 to 40% drop in tire production if it switched back to wholesale natural rubber usage.

Mr. Rockoff estimated that synthetic rubber now accounts for about 85% of all new rubber going into passenger car tires. The average truck tire, which until recently was highly dependent on natural, now is composed of anywhere from 65 to 75% synthetic, he estimated.

Indicative of the growth of synthetic rubber, the government-owned plant at Houston, Texas, has stated that it is now the largest producer of synthetic rubber in the world. Operated by the Goodyear Synthetic Rubber Corp., the Houston plant's over-all production in 1951 was 100,111 long tons. This topped the individual output of all other facilities engaged in the accelerated rubber program. Net production of GR-S at Houston was 86,384 long tons, also high for the year.

Meanwhile at Akron, Ohio, the nitrile rubber unit of the B. F. Goodrich Chemical Co. was hit by an explosion which caused an estimated $50,000 in damages and injured two employees. Damage to the building consisted mostly of broken window panes and window sections. Damage to equipment was said to be slight. Officials said the blast may have been caused by gas escaping from a reactor.

Senate Eyes "Monopolies"

In a report of 1951 activities issued by the Senate Committee on Small Business, gratification was expressed that 25 small companies have been brought into the operation of synthetic rubber plants for the government. "Fortunate developments" of the last year have provided more rubber and "greatly improved" the position of small and medium sized firms in the industry, the report said.

The committee, however, was "uneasy about the general balance of power within the rubber industry," and stated that while there exists the possibility of a sudden deterioration of the present circumstances, it feels it would be unwise to discontinue the observance of the small business rubber problem.

Consequently, the committee said that it plans to keep under closest observation the existence or development of any conditions which even give the appearance of fostering monopoly in any and all segments of the industry. Among the "fortunate developments" the committee counted the wholesale improvement in supplies of new rubber. This permitted greater government allocations to industry's smaller operators in the last half of 1951.

The committee, however, was distressed over the state of affairs in a major and important industry which the report described as: "A low plateau dominated by the monolithic giants, United States Rubber Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., and the Firestone Tire & Rubber Co."

The four "enjoy the distinction of being the sole producers of tires, the so-called original equipment, for new passenger cars," the report went on. "The rest of the industry contents itself with sharing in the production of replacement tires, camelback and innumerable products and parts made of rubber which range from huge conveyor belts to crutch tips."

The report went into great detail on the work of the special rubber subcommittee which was set up last March and held hearings over a period of three months. At that time the smaller firms complained they were not getting enough rubber, while the larger firms were getting more than they needed. The big firms testified that they were not getting enough either, while government rubber experts testified that there just wasn't enough to go around. As the hearings progressed, however, the supply situation brightened, particularly in synthetic rubber. In this way, the complaints of the industry tended to dwindle.

Urges Lifting of Whitewall Ban

New pressures are being exerted on NPA to lift its ban on the production of white sidewall tires. The latest effort was initiated by Representative George Bender (Rep., Ohio), who protested to NPA that while these tires can't be made in the United States, Canadian companies are "turning them out in great quantities" for sale in the United States.

"According to my informants in the rubber industry," Mr. Bender wrote E. D. Kelly, director of the NPA Rubber Division, "there is absolutely no shortage whatever of the rubber required in this process." The congressman said he made a thorough check of the situation with rubber manufacturers in Akron.

He added that the tire firms were at a "complete loss" to understand why NPA continued to prohibit these tires when Canadian companies could produce them in unlimited amounts. NPA banned the whitewall tire in February, 1951, as part of a sweeping effort to conserve natural rubber.

Pricing of Rubber Products

The Office of Price Stabilization, on January 17, granted manufacturers of some rubber products the option of adjusting their ceiling prices to conform with "Capehart" regulations. The option was granted to manufacturers pricing under Supplementary Regulation 8 of CPR 22. In Amendment 4 to SR 8, OPS lifted the earlier bar for applying Capehart adjustments to products priced under this regulation.

SR 8, which covers most rubber products other than tires and tubes, requires manufacturers to fix their ceilings by applying industry-wide percentage cost adjustment factors. If they want to, they can now use SR 17 and SR 18 Capehart formulas to reflect increases over pre-Korea prices which took place up to last July 26.

Manufacturers applying Capehart regulations to products in one category of SR 8, do not have to apply them to SR 8 products in other categories.

On January 24, OPS issued Amendment 5 to SR 8. This amendment prescribes the manner in which a manufacturer may apply for an adjustment. Application may be made if the manufacturer's ceiling on any product having uniform industry-wide specifications is lower than the ceilings of all competitive sellers of the identical commodity, and does not reflect the customary competitive price relationship of the product with competitive products prior to June 24, 1950.

The Director of Price Stabilization may authorize an increase in the manufacturer's ceiling if it does not bring the ceiling price above (1) the price that would reflect the customary competitive price relationship between the product and competitive products prior to June 24, 1950, and (2) the ceiling price of the lowest priced competitive seller of such commodity.

OPS, on January 11, announced a reduction in the dollars-and-cents ceiling prices on 4-ply passenger car tire carcasses, which constitute about 95% of the total supply. The retail ceiling was reduced from $3.50 to $3.00 and the wholesale ceiling from $2.60 to $2.40. Simultaneously, a premium of $1.00 each over 4-ply tire carcass ceilings was established for 6-ply carcasses, at both wholesale and retail.

These changes are prescribed in Amendment 2 to SR 49 of the General Ceiling Price Regulation. Thirty days were al-

lowed between the issuance and the effective date, February 11, 1952, so as to permit dealers, recappers and retreaders an opportunity to move inventories obtained at the old ceilings.

The changes are in line with returns from a survey of the industry which showed that prices set by SR 49 on August 22, 1951, exceeded prices generally prevailing during the GCPR base period. When SR 49 was issued, OPS stated the prices then established would be subject to later confirmation or adjustment, which has now been effected.

Amendment 2 also makes clear that the ceiling for a recap or retread is determined by applying the ceiling for the particular service performed to the appropriate carcass ceiling. Thus, if a seller has a higher ceiling for retreading white sidewall tires than for other tires, he may apply this ceiling to the appropriate carcass ceiling in figuring his ceiling on a white sidewall recap or retread.

Pricing of Rubber Chemicals

Members of the Rubber Chemicals Industry Advisory Committee at their second meeting with OPS officials on January 28, discussed the scope and form of a tailored regulation for rubber processing chemicals. Agency representatives explained that, under the Capehart amendment, the industry would be required to absorb cost increases occurring subsequent to July 26, 1951, the cut-off date for adjustment set by that amendment.

OPS officials advised the committee that study of the industry's Form 8 filings on rubber chemicals showed that a uniform increase of 3.767 percent in its GCPR price level for these products would be appropriate in lieu of widely disparate percentage adjustments by individual firms.

After discussion by committee members, the OPS proposed list of specific rubber chemicals for which individual ceiling prices were to be set was adjusted to reflect tonnage items, and excluded minor specialties. The OPS proposal that ceiling prices of all other rubber chemicals be adjusted to 103.767 percent of their respective GCPR ceilings was generally acceptable. This factor is subject to revision.

It was also recommended by the committee that adjusted prices be rounded to the nearest half cent per pound, and apply to sales to ultimate consumers in the rubber industry. For purposes of the proposed price regulation, the following definition for rubber chemicals was presented by OPS:

Synthetic organic chemicals used in the compounding and processing of rubber, including accelerators of vulcanization, activators of vulcanization accelerators, antioxidants and stabilizers, retarders of vulcanization and peptizers. At the suggestion of the committee synthetic organic vulcanizers were added to the list. Excluded under the definition are such products as plasticizers and softeners, aromatic odors, blowing agents, organic pigments, lubricants, extenders and rubber substitutes.

OPS officials explained that the calculations would be made in terms of prices per pound for sales in ton lots. The customary dollars-and-cents differentials in effect for each company and all other terms and conditions of sale in effect under GCPR would apply. New products would be priced in accordance with CPR 22.

In Amendment 7 to SR 29, GCPR, dated January 28, resellers of sodium silicofluoride are authorized to pass on to consumers increases in the manufacturers' ceiling prices established under SR 50 to GCPR.

Controlled Material Allotments

The Defense Production Administration has announced allotments of controlled materials for the second quarter of 1952. Under the allotments, the NPA Rubber Division has been allowed 32,395 tons of steel, 3,588,000 pounds of copper and copper base alloys, and 954,000 pounds of aluminum.

The Rubber Processing Machinery Industry Advisory Committee, meeting with NPA officials on January 16, reported no apparent difficulty in obtaining materials allotted under the Controlled Materials Plan in the first quarter of 1952 and a definite improvement in this situation over the third quarter of 1951.

NPA officials reported on the current materials outlook as follows: Copper continues to be tight and will be so for some time to come. Some steel areas are easing, but certain types of plate are very difficult to get. The aluminum picture should be better by the end of the year when facilities for producing prime aluminum will come into production. There is some chance of an increase in aluminum imports before the end of 1952.

Committee members told the NPA that shortage of labor is their most pressing problem. They said that even while certain companies in the industry have defense or defense-supporting contracts, labor is being "pirated" by aircraft factories, tank manufacturers and other direct defense industries.

The committee cited the Akron, Ohio, and New Haven, Conn., areas as two cases where employees, from machine operators to draftsmen and engineers, are leaving their factories to go into direct defense work at wages higher than those which rubber processing machinery makers can pay without violating the law. NPA agreed to study the situation.

NPA was told that, in general, the industry had about 8% of its orders rated. For some companies, this percentage went as high as full-time defense or defense supporting orders. The committee reported that there seemed to be an increasing trend toward this type of manufacture, though many companies are refusing defense contracts in anticipation of the rubber facilities expansion program. NPA said this program is now being considered by the Defense Production Administration's Office of Program and Requirements (as reported above).

Helicopter De-Icing System

Bell Aircraft Corp., Buffalo, N. Y., has developed what it describes as the first successful de-icing system for helicopter rotor blades. Tests were made of the device, likened to a rubber boot, at the Naval Air Materiel Center on the summit of Mt. Washington, N. H., last November and December. Fifty de-icing tests were made under various weather conditions, the company said, without a single failure. The rubber boots, with wires imbedded in them to carry heat, cover about a third of each of the helicopter's two blades. The rubber boots themselves were made by the B. F. Goodrich Co. of Akron, Ohio.

Ekholm Named General Manager

Wesley C. Ekholm has been named general manager of the carbon black operations of the Columbian Carbon Co., New York, N. Y., succeeding Herbert H. Reardon, who retired as executive vice-president and a director of the company on January 1. Mr. Ekholm previously occupied the position of superintendent of carbon black production under Mr. Reardon. Prior to that time, Mr. Ekholm held a top position in the Research and Development Department of the company. He came to the company after graduation from Rice Institute as a chemical engineer. Mr. Reardon had directed all of Columbian Carbon's carbon black production as well as its oil and gas and gasoline operations for 25 years. He had been connected with the company for 35 years.

Midland Glue Changes Name

Midland Glue Products Co., as a result of growing product diversification, has changed its name to the Midland Adhesives and Chemical Corp. and is now in full production at its new plant at Ferndale, Mich. The organization was originally founded in 1925. Approximately 20,000 square feet of space are available in the new plant for the manufacture of a wide range of adhesives utilizing natural and synthetic latices, thermoplastic and thermosetting resins, and vegetable and protein derivatives. The company's Technical Research Division has been greatly enlarged and is now staffed to work on continuous research and adhesive formula development and testing.

Olin Marks 25th Anniversary

January 1, 1952, marked the 25th anniversary of the R. R. Olin Laboratories, P. O. Box 372R, Akron 9, Ohio. The firm was founded on the first day of 1927 at which time its laboratory equipment consisted chiefly of a 6 by 12-inch rubber mill, a small hand screw vulcanizing press, a tensile sheet mold and a Scott tensile tester. R. R. Olin was the "staff". Today, the firm operates many different types of testing machinery and equipment with a greatly enlarged staff.

JOINT SAE-ASTM COMMITTEE ON AUTOMOTIVE RUBBER HOLDS MEETING

The 58th meeting of the Technical Committee on Automotive Rubber, which functions under the joint auspices of the American Society for Testing Materials and the Society of Automotive Engineers was held in Detroit on December 12, 1951. Preceding the meeting of the joint committee, meetings of the various sections and subgroups of the committee were held on December 10 and 11.

The joint committee took final action on a further revision of the Specifications for Rubber and Synthetic Rubber Compounds for Automotive and Aeronautical Applications (ASTM D 735; SAE R-10). An important addition to the revised specifications was a new table of physical requirements for synthetic rubber compounds designated as Type T, Class TA, temperature resistant. This new type covers the silicone compounds which are intended for service where a specific resistance to the effects of prolonged exposure to abnormal temperatures is required.

A new Tentative Recommended Practice for Classifying Elastomeric Compositions for Resilient Mountings has been approved by letter ballot of the committee and presented to the parent societies for publication. This recommended practice provides a means for classification of compositions based on the Yerzley mechanical oscillograph for measuring mechanical properties in accordance with ASTM Method D 945. Requirements for the new polyacrylate rubbers are being considered for inclusion in these specifications, the committee said.

Hydraulic Hose Specifications

Five new specifications for hydraulic hose have been approved by vote of the committee and submitted to the SAE for publication covering the following types of hose: (1) Single wire braid, rubber covered hydraulic hose; (2) Double wire braid, rubber covered hydraulic hose; (3) Single wire braid, cotton covered hydraulic hose; (4) Two braid fiber (nonmetallic), rubber covered hydraulic hose, and (5) Wire inserted, hydraulic suction hose.

The matter of test liquids or reference fuels used in immersion tests of rubber and rubber-like materials was the subject of considerable discussion. ASTM Method D 471 specifies two reference fuels: reference fuel No. 1, diisobutylene, and reference fuel No. 2, a mixture of diisobutylene benzene, toluene, and xylene, both with inhibitor. In addition there are now three other reference fuels for immersion tests in military specifications. This has resulted in the need for laboratories maintaining supplies of five different fuels for these tests.

A questionnaire has been circulated to members of the committee and also to the membership of Subcommittee XIX on Tests for Properties of Rubber and Rubberlike Materials in Liquids of ASTM Committee D-11 on Rubber and Rubber-like Materials. When results of this questionnaire are available it is planned to hold a joint meeting of all those interested, including representatives of Government, aeronautical, and other interested laboratories, so that full consideration can be given to this important matter.

New Specifications for Rubber Cups for Hydraulic Actuating Cylinders for Heavy-Duty Vehicles (SAE R-62) have been completed and the companion Specifications for Rubber Cups for Passenger Cars and Other Moderate-Duty Vehicles (SAE R-60) brought up to date. Both specifications cover performance tests for the cups under specified conditions but do not include requirements relating to chemical composition, tensile strength, etc. It was announced that the committee will undertake the preparation of specifications for brake boots for automotive vehicles.

Non-Metallic Gaskets

The new Specifications for Non-metallic Gasket Materials for General Automotive and Aeronautical Purposes (ASTM D 1170; SAE R-90) are now being published by the parent societies. The committee is conducting round-robin tests on impregnated paper gaskets of the glue-glycerin type and is also investigating the Mullen bursting strength test for gaskets.

The increasing use by automobile manufacturers of colored rubber mats and other rubber trimming for the interiors of passenger cars has made it necessary for the committee to consider techniques for color matching, to measure color changes during service, and also to tear and abrasion resistance of mats and similar interior rubber furnishings. In studying the color problem, the committee has given consideration to use of the Color Harmony Manual developed by the Container Corporation of America. This manual appears to be particularly well suited to the problems being encountered in the automotive rubber industry. The committee expressed considerable interest in a Symposium on Color Difference Specifications to be sponsored by ASTM Committee E-12 on Appearance, at its meeting to be held in Cleveland during ASTM Committee Week.

Outdoor Exposure Tests

The Section on Static Exposure Testing reported plans for a comprehensive series of outdoor exposure tests on 8 rubber compounds at 17 locations. Mounted specimens of all 8 compounds are to be sent each month for 12 months to each of the exposure stations. Test exposures will be made for one calendar month at the end of which period the specimens will be returned to a central testing laboratory for rating and the obtaining of information on seasonal variations. The exposure test stations are distributed throughout the United States in Texas, California, Florida, Arizona, Illinois, Delaware, Michigan, New York, Ohio, Massachusetts, and Indiana.

The Section on Low Temperature Properties of Elastomers submitted for vote a new tentative recommended practice for determining low-temperature properties of automotive rubber compounds, covering the following four types of tests: flexibility, compression, brittleness, and hardness.

G-E Chemical Personnel Changes

Four new appointments have been announced by the Chemical Division of the General Electric Co., Pittsfield, Mass. John L. McMurphy has been appointed manager of the Plastics Department; Sam L. Brous has been named general manager of the Chemical Materials Department; James W. Raynolds has been appointed marketing manager of the Chemical Division; and Dr. Alphonse Pechukas has been named engineering manager of the division. Mr. McMurphy joined G-E in 1930. In his new post he succeeds Herbert M. Brinsman who has resigned his position with the company. Mr. McMurphy is a graduate of Nebraska State Teachers College and Iowa State College. Mr. Brous came with G-E in 1949 from the B. F. Goodrich Chemical Co., where he was manager of the Chemical Sales Department. Prior to his recent appointment, Mr. Brous was marketing manager of the Chemical Division. He holds a masters degree from the University of Missouri. Mr. Raynolds, who succeeds Mr. Brous as marketing manager of the Chemical Division, is a graduate of Lafayette College with a degree in chemical engineering. He joined the company in 1949 as sales manager of silicone products. The same year he was made assistant department manager on silicones, the position he held until his new appointment. Dr. Pechukas, now engineering manager of the Chemical Division, had been engineering manager of the Chemical Materials Department since 1950. He was formerly director of research for the Columbia Chemical Division of the Pittsburgh Plate Glass Co. Dr. Pechukas is a graduate of the University of Chicago, and holds a B. S. and a Ph. D. degree in chemistry.

Dewey & Almy Arranges Loan

Dewey & Almy Chemical Co., Cambridge, Mass., has arranged to borrow $2,000,000 from W. R. Grace & Co., New York, N. Y., for five years. The loan will bear interest at 3½% and may be converted into Dewey & Almy common stock at any time after two years at the option of either company. The basis of the stock for conversion would be determined in accordance with a formula, it was announced, and would be approximately $25 per share less 15c for each elapsed quarter from February 1, 1952, to the date of conversion. If the conversion option is exercised, W. R. Grace & Co. would own less than 10% of the outstanding stock, Dewey & Almy officials said. This loan, together with additional borrowing currently being discussed with insurance companies, will provide for further plant expansion and working capital.

Hewitt-Robins to Move Offices

On or about April 1, 1952, Hewitt-Robins Inc. will move its executive offices from New York, N. Y., to Stamford, Conn. The firm explained that rapid expansion in recent years, coupled with inadequate space in its present offices, prompted the decision to move to Connecticut.

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French Industry Team Visits U. S.

Under the auspices of the Mutual Security Agency, Washington, D. C., a French Industry Productivity Team composed of 14 representatives of the French rubber industry was taken on a recent tour of rubber installations in the United States. During its visit, the team visited different rubber plants and other points of interest and considered a full range of questions relative to the manufacture of rubber products in the United States. The visitors were enabled to study and observe operations that are characteristic of general conditions in the industry. Upon its return to France, the team will prepare a report on its impressions and observations. This report will be disseminated to all segments of the French Rubber Industry, together with any recommendations that might contribute to increased productivity.

The photograph above shows the 14-man French Industry Productivity Team which recently visited the United States under the auspices of the Mutual Security Agency. Participating members include: 1—Jacques Baratte (Pincot & Baratte); 2—Robert Apine (Kleber-Colombes); 3—René Augereau (Caoutchouc S.I.T.); 4—George Boyer (Auto-Cable); 5—Lucien Carnoy (Hutchinson); 6—Marcel Delamar (Palladium); 7—Jean Duttlinger (Wolber); 8—André Guella (Hutchinson); 9—André Lazou (Kleber-Colombes); 10—René Millot (Dunlop); 11—Robert Planelle (Kleber-Colombes); 12—Michel Rideau (Hutchinson); 13—Henri Saint-Maurice (Dunlop); 14—Mario Siccardi (Kleber-Colombes).

Pennsalt-Sharples Chemicals Merge

The combination of Sharples Chemicals Inc., Philadelphia, Penna., with the Pennsylvania Salt Manufacturing Co., also of Philadelphia, through an exchange of common stock has now been effected. For the present, Sharples Chemicals will continue to operate as a separate unit of Pennsalt with, however, an exchange of technical information and cordination of some policies to the mutual benefit of both organizations. Pennsalt officials said the combination with Sharples Chemicals gives Pennsalt an established position in the synthetic organic chemical field. It also assures Sharples Chemicals a supply of some of its basic raw materials, some of which are produced at Pennsalt's Wyandotte, Mich., plant, adjacent to the Sharples Chemicals plant.

J. M. Huber Plans New Plant

J. M. Huber Corp., New York, N. Y., has announced plans to construct a plant to produce chemicals and pigments at Havre de Grace, Md. The plant will be under the supervision of John R. Lill, manager of the company's Chemicals Division. Production is expected to begin within three months. One of the first products to be produced at the plant will be a reinforcing white pigment known as Zeolex 20, which is described chemically as a silico aluminate. It is expected to find an active demand in rubber and plastic products. The basic elements of Zeolex pigments are found in kaolin clay.

Adding to Silicone Facilities

Dow Corning Corp. has begun an expansion project at Midland, Mich., which will double its facilities for producing silicone resins and related products. The new plant-expansion program involves installation of one of the largest electric arc furnaces in existence, for the purpose of producing silicon carbide, base material for the resins. With this new expansion, Dow Corning, jointly owned by the Dow Chemical Co. and the Corning Glass Works, will have trebled its capacity since World War II.

Raises Vinyl Plasticizer Output

Hercules Powder Co., Wilmington, Del., has announced that its capacity for the production of "Hercoflex" vinyl plasticizers has been stepped up 40% to meet customer demand. These plasticizers are manufactured by Hercules at Mansfield, Mass., and were first introduced to the trade in 1949. Hercoflex 150 and 250 are primary phthalate-type plasticizers whose low temperature and low volatility properties are said to be superior to those of conventional phthalates. Hercoflex 150 is manufactured from a blend of straight chain octyl and decyl alcohols chosen to yield low temperature performance with low volatility. Hercoflex 250 has found use generally throughout the vinyl industry wherever phthalate esters are employed. The increase in plasticizer output makes a third plasticizer, Hercoflex 290, available for the first time in tank car quantities. Hercoflex 290 is the adipic acid ester of a blend of straight chain octyl and decyl alcohols. It combines the excellent low temperature performance and economy of adipates, with the low volatility associated with conventional phthalates, azelates, and sebacates, the company states.

To Address Elastomer Group

The March 20th meeting of the Elastomer and Plastics Group of the Northeastern Section, A.C.S., to be held at the Massachusetts Institute of Technology, will be addressed by R. S. Havenhill, head of the rubber laboratory of the St. Joseph Lead Co. Mr. Havenhill will speak on "The Role of Electrical Charges in Rubber Compounding." In his discussion, the speaker will cover the role played by electrical charges on rubber and pigments in mastication, pigment dispersion and in the physical properties of cured rubber.

Elected Cyanamid President

Kenneth C. Towe, associated with the American Cyanamid Co., New York, N. Y., since 1926, has been elected president of the company succeeding the late Raymond C. Gaugler. Mr. Towe has been a director of the company since 1939. He first joined the company as a member of the Accounting Department. He progressed through the positions of assistant treasurer and comptroller and was appointed treasurer in 1939. In 1945, Mr. Towe was promoted to vice-president in charge of finance, a position he occupied until his election as president. Born in Elizabeth City, N. C., Mr. Towe was educated at Trinity College (now Duke University). In addition to his company activities, Mr. Towe is a director of the Putnam Trust Co. of Greenwich, Conn., and a member of the advisory board of the Chemical Bank and Trust Co., Rockefeller Center Branch, New York City. Howard Huston, vice president of American Cyanamid, was elected a director of the company to fill the vacancy created by the death of Mr. Gaugler.

ASTM Schedules Committee Week

The technical feature of the Spring Meeting of the American Society for Testing Materials, Committee Week, has been scheduled for March 3 to 7, inclusive, in Cleveland, Ohio. Among the ASTM committees which have thus far signified their intention of meeting in Cleveland, is Committee D-11 on Rubber and Rubberlike Materials. The basic purpose of Committee Week is to allow a large number of the men who serve on different technical committees to attend meetings of diverse groups in a concentrated period. Meetings will be held at the Hotel Statler in Cleveland.

COMMITTEE D-11 ON RUBBER REPORTS CONTINUED PROGRESS

The technical committees of the various divisions of the American Society for Testing Materials achieved many important accomplishments during 1951, according to a recent summation of 1951 activities issued by the Society. Several important new standards were approved and considerable new research was launched.

Among the significant accomplishments of Committee D-11 on Rubber and Rubberlike Materials were new specifications and tests relating to gasket materials, vulcanized rubber, automotive compounds, and tape, the latter involving emergency alternate provisions. These are briefly discussed below.

The new specifications for non-metallic gasket materials for general automotive and aeronautical purposes (D 1170) were developed by the joint SAE-ASTM technical committee on automotive products. Covering materials that are composed of natural or synthetic rubbers, cork, papers, asbestos, and various combinations, the new specifications have resulted from intensive work over at least two years, the committee said.

The new test (D 1147) for compressibility and recovery of gasket materials is essentially a short-time test applicable to sheet gasket materials.

The test for discoloration of vulcanized rubber-organic finish coated or light colored (D 1148) sets up standard conditions for producing and evaluating changes in color which may result from exposure to heat and sunlight.

The new method for accelerated ozone cracking of vulcanized rubber (D 1149) gives an estimate of the relative resistance to cracking when the material is exposed, under tension, to air with low ozone.

The ability of rubber or synthetic compounds used for automotive parts to withstand weathering is very important in many applications and a standard test for determining this is provided in new method D 1171.

On May 26, 1951, emergency alternate provisions were issued in the specifications for friction tape (D 69) and rubber insulating tape (D 119). The reduced allocation of crude rubber justified these provisions which in the case of D 69 omits the adhesion test after oven aging and increased slightly the number of permissible pinholes. In D 119 the requirement for natural rubber was eliminated and properties were somewhat modified.

Heyden Resorcinol Production

Heyden Chemical Co., New York, N. Y., has begun the production of resorcinol at its Garfield, N. J., Division plant at the rate of 6,000,000 pounds a year. Heyden officials said the enlarged resorcinol plant at Garfield is the first step in an expansion program to increase Heyden resorcinol facilities to 1,000,000 pounds annually. The company has applied to the National Production Authority for a Certificate of Necessity to construct the additional plant capacity. Resorcinol is one of the few chemicals still on allocation by NPA due to its urgent need for defense purposes.

Coming Events in the Rubber Industry

Mar. 3-7. A.S.T.M., Spring Meeting and Committee Week, Hotel Statler, Cleveland, Ohio.

Mar. 4. Kitchener Rubber Group, C.I.C., Dominion Rubber Co., Kitchener, Ont., Canada.

Mar. 4. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Calif.

Mar. 6. No. California Rubber Group, Elks Club, Berkeley, Calif.

Mar. 10-19. American Toy Fair, Hotels McAlpin and New Yorker, New York, N. Y.

Mar. 11. Ontario Rubber Section, C.I.C., Hart House, Toronto, Ont., Canada.

Mar. 20. Quebec Rubber and Plastics Group, Queen's Hotel, Montreal, Que., Canada.

Mar. 21. Boston Rubber Group, Hotel Somerset, Boston, Mass.

Mar. 21. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Mar. 27. Ft. Wayne Rubber & Plastics Group, Hotel Van Orman, Ft. Wayne, Ind.

Apr. 1. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

Apr. 3. No. California Rubber Group, Elks Club, Berkeley, Calif.

Apr. 4. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Apr. 8. Kitchener-Ontario Rubber Groups, Joint Meeting, Dominion Rubber Co., Kitchener, Ont., Canada.

Apr. 17. Quebec Rubber and Plastics Group, Queen's Hotel, Montreal, Que., Canada.

Apr. 17. Rhode Island Rubber Club, Metacomet Country Club, Providence, R. I.

Apr. 25. Detroit Rubber and Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Apr. 30-May 1-2. Rubber Division, A.C.S., Spring Meeting, Netherlands Plaza Hotel, Cincinnati, Ohio.

May 2. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

May 6. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

May 8. No. California Rubber Group, Elks Club, Berkeley, Calif.

May 9. Connecticut Rubber Group, United Illuminating Co. Auditorium, New Haven, Conn.

May 13. Ontario Rubber Section, C.I.C., General Brock Hotel, Niagara Falls, Ont., Canada.

June 5. No. California Rubber Group, Elks Club, Berkeley, Calif.

June 7-8. Los Angeles Rubber Group, Outing, Hotel Del Mar, Del Mar, Calif.

June 7. So. Ohio Rubber Group, Inland Activities Center, Dayton, Ohio.

June 13. Boston Rubber Group, Outing, United Shoe Country Club, Beverly, Mass.

June 19. Rhode Island Rubber Club, Outing, Metacomet Country Club, Providence, R. I.

June 20. Akron Rubber Group, Outing.

June 23-27. A.S.T.M., Fiftieth Anniversary Meeting, Hotels Statler and New Yorker, New York, N. Y.

June 27. Detroit Rubber and Plastics Group, Outing, Forest Lake Country Club, Pontiac, Mich.

Sept. 4. No. California Rubber Group, Elks Club, Berkeley, Calif.

Sept. 9. Connecticut Rubber Group, Outing.

Sept. 11. So. Ohio Rubber Group, Engineers Club, Dayton, Ohio.

Sept. 14-19. A.C.S., Annual Meeting, Atlantic City, N. J.

Sept. 25. Ft. Wayne Rubber and Plastics Group, Hotel Van Orman, Ft. Wayne, Ind.

Oct. 3. Detroit Rubber and Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Oct. 7. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

Oct. 9. No. California Rubber Group, Elks Club, Berkeley, Calif.

Oct. 17. Boston Rubber Group, Hotel Somerset, Boston, Mass.

Oct. 29-31. Rubber Division, A.C.S., Fall Meeting, Hotel Statler, Buffalo, N. Y.

Nov. 6. No. California Rubber Group, Elks Club, Berkeley, Calif.

Nov. 11. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

Nov. 14. Connecticut Rubber Group, Fall Meeting.

Dec. 4. Ft. Wayne Rubber and Plastics Group, Hotel Van Orman, Ft. Wayne, Ind.

Dec. 12. Boston Rubber Group, Hotel Somerset, Boston, Mass.

Dec. 12. Detroit Rubber and Plastics Group, Christmas Party, Detroit-Leland Hotel, Detroit, Mich.

Dec. 13. So. Ohio Rubber Group, Miami Valley Golf Club, Dayton, Ohio.

PRODUCTION OF CASINGS IN 1951 LOWER THAN FIGURE SET IN 1950

According to the Rubber Manufacturers Association, production of automotive casings in 1951 totaled 83,450,409 units, compared with the 92,754,016 units produced in the previous year. In 1951, 65,634,104 passenger casings and 17,816,305 truck and bus casings were produced. In 1950, 78,508,174 passenger casings and 14,155,842 truck and bus casings were produced.

Shipments of automotive casings in 1951 totaled 78,610,764 units, of which 61,811,110 were passenger casings and 16,799,654 were truck and bus casings. In 1950, 99,587,174 casings were shipped, including 83,422,966 passenger casings and 15,164,208 truck and bus casings.

At the end of 1951 there were 8,773,234 casings on hand, including 6,976,792 passenger casings and 1,796,442 truck and bus casings. This compares with 3,793,517 automotive casings on hand at the end of 1950, of which 3,050,301 were passenger casings and 743,216 were truck and bus casings.

RMA also reported that in 1951 there were 67,476,744 passenger (including motorcycle) and truck and bus tubes produced, against the 80,178,950 tubes produced in the previous year. There were 65,710,980 tubes shipped in 1951, compared with the 84,722,883 tubes shipped in the previous year. At the end of 1951 there were 10,115,742 tubes on hand, while at the end of the preceding year there were 6,725,975 tubes in inventory.

NPA Rubber Division Names Brown

The National Production Authority has announced the appointment of Harry D. Brown as deputy director of the Rubber Division. Mr. Brown, formerly a consultant to the director of the Rubber Division, succeeds E. A. Harris, who has joined the Reconstruction Finance Corp. Mr. Brown is assistant production manager of the Gates Rubber Co. of Denver, Colo., and has, since 1936, been affiliated with the company in various capacities including material requirements and production planning. During World War II he served as a consultant to the Office of the Rubber Director in the War Production Board, and the Office of Rubber Reserve, RFC. His appointment as deputy director on a loan and full-time consulting basis will initiate a rotating procedure in the Rubber Division whereby the position of deputy director will be filled for six-month periods by qualified personnel from industry.

Chicago Group Incorporates

At a meeting of the Executive Committee of the Chicago Rubber Group in November, 1951, it was unanimously decided to incorporate the group under the laws of the State of Illinois. Appropriate papers were filed and a certificate of incorporation granted effective January 11, 1952. L. F. Taylor (Commercial Solvents), president of the group, is listed on the corporate certificate as the permanent registered agent of the Chicago Rubber Group.

GOODRICH CHEMICAL ANNOUNCES PROMOTION OF RICHARDS AND BRANDT

J. C. Richards, Jr.

A. I. Brandt

James C. Richards, Jr., formerly manager of international sales for the B. F. Goodrich Chemical Co., has been elected vice-president in charge of sales. Allyn I. Brandt, previously general sales manager, has been appointed general merchandising manager. Mr. Richards succeeds John K. Hoover, who recently was elected president of the company. The new vice-president in charge of sales joined the B. F. Goodrich Co. in 1934 as a chemist in the general chemical laboratories in Akron. From 1935 until 1938 he was a chemical engineer working on reclaimed rubber, then general foreman of Akron Plants 5 and 6 for five years. He became production manager of the government's synthetic rubber plant at Louisville, Ky., operated by Goodrich, in 1943 and in 1944 was appointed plant manager of the government plant at Borger, Texas, also operated by the company. In 1946, Mr. Richards was named head of the Hycar Rubber and Chemical Sales Department of B. F. Goodrich Chemical, a division of the parent company. He became manager of international sales in 1949. He is a graduate of Kansas State College in 1934 with a B. S. degree in chemical engineering.

Mr. Brandt joined B. F. Goodrich in 1930 as technical assistant to the vice-president, industrial products. He was later made vice-president of the Philadelphia Rubber Works Co., the reclaimed rubber subsidiary of the B. F. Goodrich Co. With the formation of Goodrich Chemical in 1945, Mr. Brandt was appointed general domestic sales manager. In his new capacity as general merchandising manager, Mr. Brandt is assuming increased responsibilities. His broadened duties include supervision of merchandising policy and procedures of export as well as domestic sales. He will also supervise government relations. Mr. Brandt was graduated from the Case Institute of Technology with a B. S. degree in chemical engineering in 1920.

U.S. Rubber Votes Stock Split

The board of directors of the U. S. Rubber Co. on January 9, recommended that the common stock be split two shares for one, with the expectation that a stock dividend of 50% of the new stock will thereafter be declared, thereby providing for three shares for the present one share. Stockholders will be asked to vote on the proposal at the annual meeting on April 25. They will also act on the board's recommendation to increase the number of authorized common shares from 2,500,000 to 10,000,000, the remaining unissued shares to be available for general corporate purposes. There are no present plans for the issuance of such shares. U. S. Rubber has 1,761,092 shares of common stock, par value $10, outstanding. The new shares will have a par value of $5. The board recommended the split with the expectation that it will further increase the number of shareholders. The company now has more than 16,000 common stockholders, an increase of 26% since 1945.

American Hard Rubber Personnel

V. A. Culver, formerly superintendent of procurement at the Akron, Ohio, plant of the American Hard Rubber Co., New York, N. Y., has been named manager of procurement for the company with headquarters in New York. Mr. Culver has been associated with the firm for the past 19 years. David Theophilis, associated with American Hard Rubber for the past 11 years, has been named superintendent of procurement at the Akron plant succeeding Mr. Culver.

Jammal Named Hershberg President

Nicholas J. Jammal, associated with the Hershberg Products Co., Ashtabula, Ohio, since June, 1951, has been elected president of the company. He will also serve as general manager of the firm. Previous to his association with Hershberg Products, Mr. Jammal was associated with the Vulcanized Rubber & Plastics Co., New York, N. Y., as works manager.

Vinylite Resin Plastigels

A new formulation of Vinylite dispersion resins has been developed by the Bakelite Co., a division of the Union Carbide and Carbon Co. Known as plastigels made of Vinylite resin, the new material can be molded, calendered, embossed, stamped and extruded; it can also be used for coating cloth, paper and dip-coating of wire objects. Particularly suited for floor tile, tubing, electrical fittings, toys, novelties, and a wide variety of other uses, plastigels of Vinylite resin resemble putty in consistency in their raw state. Relatively stiff, they can be quickly softened at room temperature by stirring or kneading, and formed by hand pressure, molds or dies into complicated shapes and fine details. After forming, plastigels gradually stiffen again, becoming self-supporting. They bake to a hard, finished state in about 10 to 15 minutes at only 350° F., without sagging, shrinking or otherwise losing their formed shapes. One of the most important advantages of Vinylite resin plastigels is that they can be handled with lighter weight equipment than is used in conventional molding and extrusion of similar plastic materials. Because high-pressure and heavy duty equipment is not required, available equipment can be adapted for processing the plastigels. The new formulation is based on Vinylite dispersion resins, plasticizer and an additive of Bentone-34, plus other modifiers and colorants.

General Tire Plans Stock Split

Directors of the General Tire & Rubber Co. have approved a proposal to split the common stock two-for-one and to reduce the par value from $5 to $2.50. The board voted to submit to the annual meeting on April 1 a proposal to increase authorized common shares from 750,000 to 1,500,000 to effect the stock split. The company presently has 587,178 shares outstanding. The board also voted to place the present common stock on an annual dividend basis of $4 by declaring a quarterly dividend of $1 a share for the initial quarter of 1952 which is payable on February 29 to stockholders of record as of February 19. The company has been paying 50c quarterly on present shares. A year-end extra dividend of $1.50 was also paid last November 30.

Philippine Rubber Co. Formed

A new Philippine rubber company, the Maryex Industrial Corp., has been organized by a group of prominent Filipino businessmen. With an authorized capitalization of $500,000, the company expects to produce 10,000 bicycle tires and tubes monthly. This quantity will be more than sufficient to supply the present requirements of the Philippines, Santiago E. Yap, president, estimates. As machinery and equipment for the plant will be purchased from Japan, Filipino technicians and engineers will undergo an initial training period in Japanese rubber factories. Mr. Yap plans to seek further financial assistance from the Economic Cooperation Administration.

WASHINGTON APPOINTMENTS

James L. Kelly, formerly acting Assistant Administrator for Small Business, National Production Authority, has been named Assistant Administrator. Mr. Kelly is also chairman of the Small Business-Executive Committee of the Defense Production Administration.

William P. Drake, vice-president of the Pennsylvania Salt Manufacturing Co., has been named Director of the Rubber, Chemicals and Drugs Division of the Office of Price Stabilization succeeding Thomas H. McCormack, who is returning to his duties as director of sales of the Grasselli Chemicals Division, E. I. du Pont de Nemours & Co., Inc.

URW Case Upheld in Tennessee

The National Labor Relations Board has ordered an end to unfair labor practices at the Paris, Tenn., plant of the Bowling Green Rubber Co., Toledo, Ohio, unanimously upholding an NLRB trial examiner. Charges had been brought against the company by the United Rubber Workers, C.I.O., which had started to organize the Paris plant in 1949 not long after it was opened. At the same time, the company was said to have started a counter-movement. The union won a bargaining election ordered by the NLRB, but 14 months of negotiation produced only a strike at the plant and no contract. The company contended that it no longer had to bargain after the employees of the plant asked the NLRB to decertify the union as their agent. The employees' request, the government agent found, was based on the employer's unfair labor practices. It was this ruling which the full board upheld.

Win Awards For Rubber Boots

Two civilian technical employees of the U. S. Navy at Brooklyn, N. Y., have received commendations for developing a rubber "thermos" boot which has met with success in Korea. The "thermos" boot is all rubber and is about the same size as the familiar leather combat boot. It is made of two layers of rubber with dead air between. The insulation of air is so perfect that a soldier can wear the boot in 60° below zero with only one pair of cotton socks. Curiously enough, the same boot is said to be cool in tropical weather. All marines in Korea have been outfitted with the boots, as have many of the Army and Navy shore forces. Shipments will continue until all ground troops have the boots. The commendations received by the civilian employees carry extra pay of $200 a year.

Marcelo Rubber Shoe Factory

According to reports reaching this country from the Philippines, Marcelo Rubber and Latex Products, Inc., will shortly complete construction of its million peso rubber shoe factory in Rizal. The plant is being equipped to produce 20,000 pairs of shoes daily. It is being constructed in cooperation with Ro-Search, Inc., of Waynesville, N. C.

G-E Forms Silicone Department

General Electric Co. has announced the formation of a new product department within its Chemical Division to be known as the Silicone Products Department. It was also announced that Dr. Charles E. Reed, formerly engineering manager of the Chemical Division, has been named general manager of the newly-formed department. Headquarters of the new department will be at Waterford, N. Y., site of the company's silicone plant. An expansion program costing in excess of $5,000,000 to greatly increase the production capacity of the plant has been scheduled. G-E officials said the formation of a separate department to produce silicones was made desirable by the rapidly expanding silicone business. Dr. Reed joined G-E in 1942 in the company's research laboratories in Schenectady, N. Y. He became manager of the chemical engineering section of the Chemical Division in 1945, and in 1948 was named engineering manager of the Chemical Division. He received his B. S. in chemical engineering at the Case Institute of Technology in 1934, and his doctor of science degree at the Massachusetts Institute of Technology in 1937.

Butyl Puncture-Sealing Tube

A new type puncture-sealing inner tube of Butyl rubber having greater air retention qualities than its natural rubber predecessor has been announced by the Goodyear Tire & Rubber Co. Important features of the tube, according to Goodyear, include its Butyl sealant material of proper consistency to seal punctures. Developed only after long research, the sealant is said to be sufficiently stabilized to maintain its position in the tube at high speeds and high temperatures. The sealant also permits the tube to meet all puncture sealing requirements without excessive weight or changes in balance under operating conditions. Still another advantage is the tube's oversize feature, present also in its natural rubber predecessor. This tends to keep the tube in compression when inflated, thereby permitting it to compress, when punctured, around the hole left by the puncturing object. Coupled with the action of the sealant, this achieves what the company terms "double seal" action.

Converse Rubber Receives Award

Converse Rubber Co., Malden, Mass., has received a "Certificate of Cooperation" from the United States Government for its part in strengthening the world's free nations against communism by supporting mutual American-European efforts to this end. The certificate, which bears the red, white and blue shield of the Economic Cooperation Administration, was accompanied by a letter which stated that the award was made in recognition of the courtesy extended by the company to individuals on technical assistance missions from Western European countries. Converse was one of two U. S. rubber footwear firms detailed to work with foreign groups from many European countries.

To Head Naugatuck Branch Office

Arthur Thomas, Jr.

Naugatuck Chemical Division of the U. S. Rubber Co., has opened a new southwestern branch office for the sale of rubber and plastic latices under the management of Arthur Thomas, Jr., who has been appointed technical representative in charge of the new branch office. The new branch will be located at 1480 North Thomas St., Memphis, Tenn. It will cover the states of Kansas, Missouri, Texas, Arkansas, Louisiana, Mississippi, Alabama, the southern part of Illinois and Indiana, and western sections of Kentucky and Tennessee. Born in Johnstown, Penna., Mr. Thomas holds a master of science degree in chemical engineering from the University of Arkansas. He joined Naugatuck Chemical in 1944 as an engineer in the Pennsylvania Ordnance Works which the company operated during World War II. Shortly after the war, Mr. Thomas was transferred to the Naugatuck Chemical plant at Naugatuck, Conn., as a process engineer and subsequently was placed in charge of the Process Engineering Department. In 1950, he was named assistant to the sales manager for latices and aqueous dispersions of rubber. Included in the Naugatuck line of products to be handled by the new branch are natural and synthetic rubber latices, Lotols, Dispersite, Kralac and Nitrex.

Revise Bureau of Ships Formulary

A considerable number of supplements and revisions to the Rubber Formulary compiled by the Bureau of Ships, United States Navy, have been prepared and issued since it was first announced in the February, 1951 issue of RUBBER AGE. This information has been prepared for the assistance of manufacturers who are engaged in or contemplate production of rubber products for use by the Department of Defense. The new formulations have been sent to most of the rubber manufacturers who received copies earlier. However, any holders of earlier issues of the formulations may check their present collections against the revised list which is available from the Chief, Bureau of Ships, Code 344, Navy Department, Washington 25, D. C.

Goodyear Suburbanite Snow Tire

A new and further improved snow and ice tire which is said to provide superior traction in both loose or hard-packed snow, as well as on icy roads, has been announced by the Goodyear Tire & Rubber Co. Known as the Suburbanite, the new tire was developed for motorists living in either suburban areas or cities and is particularly advantageous for access from home to main highway in bad weather, although it can also be used effectively by all car drivers who encounter difficulties in snow and ice. Constant tests have shown the tire to have tractive and stopping characteristics up to nearly twice that of the conventional tire tread, Goodyear engineers state. They further say that the improvements have provided a softer, smoother and quieter ride than that previously experienced from mud and snow tires, which have had a tendency to produce a somewhat noisy and annoying vibration. The tread of the Suburbanite is composed of numerous flexible blocks which bend circumferentially under pressure. The blocks are self-cleaning and present sharp edges that dig into snow and provide better grip on ice or wet, slippery pavements. Three circumferential grooves in the tread also give added resistance to side slip.

Forms International Division

U. S. Rubber Co. has announced the formation, as of January 31, 1952, of a new international division to be known as United States Rubber International, Division of United States Rubber Co. The present foreign subsidiary, United States Rubber Export Co., Ltd., has been dissolved. L. C. Boos, formerly president of the export company, has been elected a vice-president of U. S. Rubber, and has been named general manager of the new division. Mr. Boos said the new name is more descriptive of overseas activities because many of the company's products are no longer exported from the United States but are manufactured abroad. U. S. Rubber products are manufactured in Mexico, Cuba, Argentina, Brazil, Columbia, Venezuela, Uruguay, Great Britain, Sweden and South Africa. Sales branches or representatives are found in these and many other countries. Headquarters of the international division are at the Chrysler Building East, 150 East 42nd St., New York, N. Y.

Charles Muehlstein Retires

Charles Muehlstein, vice-president and a director of H. Muehlstein & Co., Inc., has retired from active service with the company. Mr. Muehlstein, who has been closely identified with the growth and development of the Muehlstein company, was with the firm for over forty-five years, most of which he devoted to the direction of the Chicago, Ill., office. Alfred Stein, vice-president and assistant to Mr. Muehlstein in the management of the Chicago office has assumed complete control of that office. Mr. Stein has been associated with the company at the Chicago office since 1916.

Named Assistant Factory Manager

Dr. G. R. Cuthbertson

Dr. G. R. Cuthbertson, associated with the U. S. Rubber Co. since 1937, has been named assistant factory manager of the company's plant at Los Angeles, Calif. Born in Liberty, Mo., Dr. Cuthbertson is a graduate of Harvard University. He began his career with U. S. Rubber as a research chemist. For the past 12 years he has been stationed at the Detroit, Mich., plant, where he held several important assignments in the Research and Development Department of the Tire Division. Most recently, he served as assistant director of research and development for the Tire Division. During World War II, Dr. Cuthbertson served on government consulting committees on synthetic rubber and synthetic tires. He is a member of the American Chemical Society and Alpha Chi Sigma. A. N. Iknayan, previously a development engineer for the company, has been named to succeed Dr. Cuthbertson as assistant director of research and development for the Tire Division with headquarters in Detroit.

New Patent Abstract Service

Picturesort Co., 246 Church St., New Haven 10, Conn., is offering a new patent abstract service. This firm will supply photographic copies of patent abstracts, weekly as issued in the Official Patent Gazette. The subscriber to the service gets only the class and sub-class or type of patents in which he is interested. The abstracts are reproduced full size on 4- by 6-inch cards, punched for instant sorting. The cost is said to be nominal and savings in time of filing, finding, sorting and using should prove substantial.

Kemp Joins Narmco Organization

A. R. Kemp, a leading authority on rubber and plastics, has joined the firm of Narmco, Inc., as vice-president, and will be in charge of research on new products in the company's plants in Costa Mesa and San Diego, Calif. Dr. Kemp was formerly in charge of research in rubber and plastics for Bell Telephone Laboratories, Murray Hill, N. J., where he had been employed for 25 years. He is a graduate of the California Institute of Technology.

WASHINGTON HEARS ADDRESSES ON BUTYL MANUFACTURE AND HISTORY

Approximately 120 members and guests of the Washington Rubber Group attended the January 16th meeting held at the Auditorium of the Potomac Electric Power Co. Building in Washington, D. C. The technical session of the meeting was based on the subject "Butyl — Its History, Manufacture, and Applications." Three speakers addressed the group on the subject, including: Dr. W. J. Sparks, director of the Chemical Division, Standard Oil Development Co.; R. M. Thomas of the Product Development Laboratory, Standard Oil Development Co.; and Dr. A. N. Ikhayan, assistant director of research and development for the Tire Division of the U. S. Rubber Co.

Dr. Sparks reviewed the early work on isobutylene polymerization starting with the first preparation of dimers in 1870. He described briefly developments leading up to the commercialization of polymers in aviation gasoline and lubricating oils. These events, along with the work of Michael Otto in Germany and later of Otto and Thomas in the laboratories of the Standard Oil Development Co., resulted in an active interest and successful commercial preparation of high molecular weight polyisobutylenes, he said.

The observations of this work and its implications to rubber theory were summarized in a paper which Dr. Sparks prepared in 1939 on the "Rubberlike Properties of Polyisobutylene". At that time, it was pointed out that polyisobutylene needed only the introduction of vulcanizable functionality to become a full-fledged synthetic rubber. This had been accomplished in the laboratory two years earlier.

By 1939, plans for the private manufacture of Butyl were well underway. At the beginning of World War II, a Butyl plant was taken over as part of the government's synthetic rubber program. Dr. Sparks also discussed some of the difficulties encountered in the steps leading to the manufacture of Butyl and in teaching the rubber industry how to use the material.

Mr. Thomas treated the manufacture of Butyl from the viewpoint of taking a visual tour through the government-owned plant at Baton Rouge, La. Recently prepared slides, many in color, were used to illustrate various phases of the manufacturing operations. The information presented included the origin and handling of raw materials, a description of the process, the process control variables, the grades of polymers which have been produced on a commercial scale, and the possibilities for the production of experimental-type products in the future.

Dr. Ikhayan covered the growth of Butyl in commercial applications. The principal reasons that Butyl rubber has reached any prominence in the rubber program are the qualities of the finished product, he said. These, of course, are its outstanding heat and age resistance coupled with air retention which is a great improvement over other tube materials.

The speaker noted that it seemed necessary, in the interest of military applications alone, to replace GR-S tubes with Butyl at the earliest possible moment. It was well-established that GR-S tubes were somewhat below the level of adequacy for military tube use, he declared.

The tube making industry soon found itself with a new material which would make desirable inner tubes. It had, however, limited knowledge of the problems surrounding manufacture. Successful production, said Dr. Ikhayan, necessarily involves more than excellence of material. Processing problems led to further investigations which eventually contributed to the success of Butyl as a tube material.

"Rubber Age" Moves Offices

We are pleased to announce the removal of our editorial and advertising offices from the 14th floor to new and larger quarters on the 21st floor at 250 West 57th Street, New York 19, N. Y. Our telephone number remains COlumbus 5-2928. We extend to all our friends in the industry an invitation to visit us at our new home.

Fort Wayne Holds Third Meeting

The third meeting of the Fort Wayne Rubber and Plastics Group was held on January 24 at the Hotel Van Orman in Fort Wayne, Ind. Two interesting technical movies were simultaneously shown in different rooms at the hotel and members had the option of viewing the one of their choice. Through the courtesy of the Godfrey L. Cabot Co., the moving picture "A Study in Black" was shown in one room, while "The Story of Tenite" was exhibited in another. The group also heard an interesting talk on basketball highlights and present trends in the sport. Dan Reahard (General Tire), chairman of the group, announced the appointment of the following members to a Nominating Committee: Armin Brandt (Schacht Rubber), chairman, and R. W. Flack, A. L. Robinson (Harwick), Cal Yoran (Brown Rubber), Dan Doherty, and Elmer Ramga (U. S. Rubber).

Announces Two New Monomers

American Monomer Corp., Leominster, Mass., has announced the first commercial production of two new monomers, ethylene glycol dimethacrylate and diallyl maleate. The new monomers find use and application in rubber chemicals, resins, polyesters, as cross-linking agents in copolymerization, etc. Diallyl maleate is supplied uninhibited and can be used as received. The ethylene glycol dimethacrylate contains inhibition which should be removed for optimum results. The company states that these two monomers show great promise as tools for the production of new plastics and low pressure laminants.

KITCHENER HEARS McCLELLAND TALK ON CARBOWAX COMPOUNDS

The January 15th meeting of the Kitchener Rubber Group held at the Office Canteen of the Dominion Rubber Co. in Kitchener, Ont., Canada, featured an address by C. P. McClelland of the Carbide and Carbon Chemicals Co. Mr. McClelland spoke on "Carbowax Compounds and Polyethylene Glycols as Aids in Rubber Fabricating."

In his address, Mr. McClelland stated that "Carbowax" compounds and polyethylene glycols have greatly facilitated the fabricating of synthetic and natural rubber. These products are a series of water-soluble, non-volatile, liquid and solid lubricants. Chemically they are all polymers of ethylene oxide but they differ from each other in average molecular weight. They are named according to their molecular weight: four liquid materials, polyethylene glycols 200, 300, 400, and 600; and five solid materials, "Carbowax" compounds 1000, 1500, 1540, 4000, and 6000. "Carbowax" compound 1500 is a blend of the 300 and 1540 compounds.

The applications of these water-soluble lubricants in rubber fabricating are of four general types: mold release of mechanical goods; mold release of foam rubber; lubrication of tire air-bags; and lubrication of products made from latices. "Carbowax" compound 4000 and some "Carbowax" compound 6000 are the choice for mold release, polyethylene glycol 400 and sometimes 300 for tire air-bag lubrication, while "Carbowax" 1500 works best in the lubrication of products made from latex. All types of rubber have been successfully lubricated with these materials, Mr. McClelland stated.

Other uses in the rubber industry include: "Carbowax" compound 1500 to prevent yellowing during the recapping of white sidewall tires; "Carbowax" compound 1000 as a heat transfer medium in vulcanizing units; "Carbowax" compound 4000 as a temporary anti-static coating for rubber products; "Carbowax" compound 6000 as a machining lubricant for hard rubber; and polyethylene glycol 400 as a component of the coagulating bath in the manufacture of latex-coated fibers.

The advantages of these polyethylene glycols lie in their good lubricating action, high flash points, water-solubility which ensures ease of application and removal, low ash content which means no unburnable residue builds up in the molds, low hygroscopicity which minimizes any chance of steam pockets being formed during hot fabricating, and low volatility which minimizes lubricant loss from hot tire bag surfaces during the return cycle from the curing molds, the speaker said.

New chemicals that have interesting possibilities for the rubber industry include the polypropylene glycols, "Ucon" brand fluids and a non-ionic surface-active compound marketed as "Tergitol" dispersant XC.

B. F. Goodrich Chemical Co., Cleveland 15, Ohio, is now sending its "Hycar Technical Newsletter" directly to customers. The new issue, No. 1, covers the subject of tackifying agents.

NATURAL RUBBER BUREAU OPENS RUBBER RESEARCH LABORATORY

The Natural Rubber Bureau, Washington, D. C., has opened a new rubber research laboratory at Rosslyn, Va., with the basic aim of fully determining the extent of the advantages brought about by the addition of rubber to asphalt for highway use. In carrying out this objective, tests will be made with every type of rubber (natural, reclaimed, synthetic, etc.) in every possible form. A wide variety of tests will also be conducted to determine the best methods of introducing the rubber into the asphalt paving material.

The Bureau's new laboratory was over a year in development. Its broad range of equipment for conducting Hveem, Marshall and Hubbard stability tests is said to make it one of the most balanced and most fully equipped laboratories of its type in the United States. The laboratory will be under the professional engineering direction of Harry K. Fisher, rubber road consultant to the Natural Rubber Bureau.

From its very first laying in 1949, the Natural Rubber Bureau has fitted its mixing specifications to those of the engineers on the local scene. The laboratory will project this thinking in all of its tests. Rather than make the varying specifications fit the rubber, the rubber will be fitted to the specifications of the various localities about the country. Also, the specifications and plant procedures will be so worked out that they will in no way retard production at the mixing plant.

In implementing this approach, road tests will be continued all over the U.S., working with all types of specifications and aggregates. Core specimens from these tests will be analyzed in the laboratory, and all field results will be interrelated and cross-checked with research findings. This correlation between field and laboratory work is bound to result in a great many facts on rubber roads that are now well indicated, but still require definitive proof, the Bureau stated.

Evaluation of the use of rubber in asphalt is still somewhat of an untapped field in highway research. In many cases it will be necessary to develop original test procedures. While the laboratory will pioneer such research as required, it will at all times adhere to the standards of the American Society of Testing Materials and American Association of Highway Officials.

In addition to a fully balanced range of standard equipment, the laboratory has developed refinements to fit its particular needs. Among these is a compacting machine which will mechanically provide specimen designs of unusual uniformity. This will insure more accurate tests, and will reduce to a minimum those variables which sometime occur in the preparation of specimens.

With the laboratory's refrigeration and heating equipment, it will be able to test paving cores under temperatures ranging from as low as minus 40 degrees Fahrenheit, to as high as any temperature found in the United States. Special refrigerator units and electrical heat ovens that simulate solar radiation make possible this range, which, in turn, permits testing under temperature variations similar to those pertaining in any part of the country. Analytical balance and special mixing rooms are also fitted with the latest equipment.

Asked whether the laboratory would conduct tests outside the field of rubber roads, Mr. Fisher answered, "Rubber roads are our primary interest, but we are not going to restrict our work to that alone. We are equipped to carry on intensive research in all phases of highway and airport paving, and in many other fields. It is also our aim to cooperatively work with the various technical societies.

"We are going to find out everything we can about the advantages of rubber roads. In order to do this, we shall carry on basic research to determine what makes a good road. By the time we have found some of the answers we are looking for, we shall have contributed a good bit of information on the subject of better and safer roads."

This photograph shows a general view of the new Natural Rubber Bureau Research Laboratory. A wide range of test machinery and equipment is said to make this one of the best equipped laboratories of its type in the country.

Shown above is a view of a rubber-asphalt specimen being put through a Hveem Stabilometer test on a high compression machine. Left background, one of the laboratory's technicians is running a test on some rubber powder. Right background, a laboratory chemist is conducting a distillation check on volatile solvents used in rubber road tests.

Firestone Officers Re-elected

All officers of the Firestone Tire & Rubber Co. were re-elected at the recent annual meeting of the board of directors. Officers are: Harvey S. Firestone Jr., chairman; Lee R. Jackson, president; John J. Shea, vice president, finance; James E. Trainer, vice president, production; Harold D. Tompkins, vice president, sales; Raymond C. Firestone, vice president, research; Harvey H. Hollinger, treasurer; Joseph Thomas, secretary and general counsel; Claude A. Pauley, comptroller; Elton H. Schulenberg, assistant treasurer; William D. Zahrt, assistant treasurer; Henry S. Brainard, assistant secretary; Timothy F. Doyle, assistant comptroller; Laurence A. Frese, assistant comptroller. The present directors were re-elected at the annual stockholders' meeting.

NEWS IN BRIEF

Goodrich is conducting a voluntary check of the eyesight of employees at the Akron plants of the company. Results of the tests are studied by the medical department and a sealed report sent to the employee.

Columbia-Southern Chemical Corp. has made available two new reports in its series of Pigment Data Bulletins. No. 51-5 covers "Hi-Sil Inhalation Tests", while No. 51-6 covers "Silene EF-Calcene TM Combinations in GR-S Sundry and Molded Goods Compounds."

A technical bulletin on the compounding and processing of Pliovic has been released by the Chemical Division of the Goodyear Tire & Rubber Co.

Augmenting its recently announced Productive Maintenance Program, General Electric is now offering a 12-minute, black-and-white, sound slide film on the subject for showing to interested groups.

The silverware container for General Electric's automatic dishwasher is being molded from G-E rubber-phenolic compound manufactured by the Chemical Division.

One of the largest identification signs for airmen in the country has been painted on the roof of one of the buildings of the B. F. Goodrich Co. in Akron. Capital letters are 35 feet high and the others are 22 feet high. The sign is about 300 feet long.

Taber Instrument Corp., North Tonawanda, N. Y., has released a new bulletin covering its 1952 model abraser. Ask for Bulletin 5105.

Data on the physical properties, typical reactions, applications, and availability of both vinyltrichlorosilane and vinyltriethoxysilane are presented in a new technical data sheet prepared by the Linde Air Products Co., 30 East 42nd St., New York 17, N. Y.

Designed to provide what is said to be the highest degree of comfort ever attained in a respirator, a number of recently engineered advances are incorporated in a new dust respirator, the Dustfoe No. 55, announced by the Mine Safety Appliances Co., Pittsburgh, Penna.

Dichlordimethylhydantoin is now being produced on a tonnage basis by the Glyco Products Co., Inc., at Natrium, West Va. It is being sold by the company under the trade name "Dantoin".

New improved Manhattan Single Groove V-Belts are described in a new bulletin issued by the Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. Ask for Bulletin 6830 B.

Construction of what is believed to be the largest single industrial warehouse in the entire South has been started in Gadsden, Ala., by Goodyear.

Effective January 1, 1952, the Thompson-Hayward Chemical Co. of Minneapolis, Minn., will be exclusive sales agents in Minnesota and the Twin Cities for all products of the Baker Castor Oil Co.

Fritzsche Brothers, Inc., 76 Ninth Avenue, New York 11, N. Y., has made available its latest wholesale price list. Copies may be obtained from the company.

Sivon Machine and Manufacturing Co., Painesville, Ohio, has issued a new circular describing Smaco safety-grip tire wire. Copies are available from the company.

A new O-ring seal compound utilizing Hycar rubber has been developed for use in farm tractor hydraulic systems by the Precision Rubber Products Corp., Dayton, Ohio.

"The Key to Your Finishing Problems" is the title of a new brochure published by the United Buff Products Corp., Passaic, N. J., describing the various features and applications of pressure-cooled Airflow buffs and Aircon wheels.

Alrose Chemical Co., P. O. Box 1294, Providence 1, R. I., has released a new technical bulletin on Sorbit, the company's sodium alkyl naphthalene sulfonate surface active agent.

The West Coast sales office of the B. F. Goodrich Chemical Co. is now located in Suite 301, 714 West Olympic Blvd., Los Angeles 15, Calif.

A new rubberized type satin interior paint, identified as "Vogue-Tone", which needs no primer or sealer for application, has been developed by the 20th Century Paint Co., Brooklyn, N. Y.

The formation of a new South Central Sales Division of Hewitt-Robins Inc., with headquarters at Houston, Texas, has been announced. L. C. Holloman has been appointed assistant division manager in charge of the newly-created division which covers Texas, West Tennessee, Oklahoma, Arkansas, Louisiana, Mississippi and Alabama.

Ball Brothers Co., Muncie, Ind., has opened a new Rubber Products Division sales office in Detroit, Mich., with Leo M. Dartz, former Firestone sales engineer, in charge as district representative.

The Tire Division of the U. S. Rubber Co. is sponsoring a new comedy-variety program on the NBC television network. The program originates in New York each Sunday from 7 to 7:30 P. M. (EST).

The Liberian Institute of the American Foundation for Tropical Medicine, established as a memorial to the late Harvey S. Firestone, was dedicated on January 11 in Harbel, Liberia, with ceremonies participated in by the president of the country and Harvey S. Firestone, Jr.

"Color Reactions Between Silica Pigments and Certain Accelerators and Antioxidants", is the title of Pigment Data Bulletin No. 52-1, recently released by the Columbia-Southern Chemical Corp., a subsidiary of the Pittsburgh Plate Glass Co., Pittsburgh, Penna.

The Belting Division of C. R. Daniels, Inc., 4900 Wetheredsville Road, Baltimore 18, Md., has released a new catalog covering all phases of attached canvas belt production. An accompanying technical data sheet gives information on the installation, operation and maintenance of Dandux stitched canvas belts. Copies are available on request to the company.

Ducting systems for chemical plants made of Uscolite are now being manufactured on a large scale by the Mechanical Goods Division of U. S. Rubber.

Formation of the Superior Lecithin Sales Division to handle the marketing of soya lecithin has been announced by Superior Metals, Inc., 120 Liberty Street, New York, N. Y.

A new 52-page engineering catalog on its line of electrical wires and cables for the coal mining industry has been published by the Electrical Wire and Cable Department of the U. S. Rubber Co., Rockefeller Center, New York 20, N. Y.

Indoil Chemical Co., 910 South Michigan Avenue, Chicago 80, Ill., has released another in its series of technical bulletins on Indonex plasticizers. Circular No. 13-46, "Indonex Plasticizers in Cold Rubber (LTP GR-S) Compounds", is available on request to the company.

Carbide and Carbon Chemicals Co., a division of the Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y., has recently published a new technical bulletin on 2,5-Dimethyl Piperazine, an alicyclic disecondary amine. Request Bulletin F-7830.

As a result of expanded production facilities, M. W. Kellogg Co., New York, N. Y., has reduced the price of "Kel-F", its fluorocarbon-type thermoplastic, more than 10% as of January 1, 1952.

American Wheelabrator & Equipment Corp., Mishawaka, Ind., has just published a new 36-page catalog, "Dust and Fume Control", which describes the various sizes and models of Dustube Collectors and the advantages to be gained from cloth filtration. Ask for Catalog 72-B.

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NAMES IN THE NEWS

DR. A. M. CLIFFORD, assistant manager of research at the Goodyear Tire & Rubber Co., has been honored by the Department of the Army for scientific services to his country during World War II.

DWIGHT R. G. PALMER, chairman of the board of the General Cable Corp., has been named chairman of the Committee on Government Contract Compliance which is charged with policing enforcement of Federal contract clauses barring racial or religious discrimination in employment.

A. E. MATHEIS, formerly sales promotion manager of the Thermoid Co., Trenton, N. J., has been named assistant sales manager of industrial rubber products.

ROY E. TROUTMAN has been named sales manager for white pigments in the Pigments Department of E. I. du Pont de Nemours & Co., Inc.

DONALD L. ECCLESTON, formerly manager of the Textile Chemical Division of the Warwick Chemical Co., a division of the Sun Chemical Corp., has been named general manager of Warwick Chemical.

R. KUFFIN COOK, formerly associated with the Plastics Division of the Monsanto Chemical Co., has been appointed technical assistant to the manager of the Resin Sales Section of the Barrett Division, Allied Chemical & Dye Corp.

REGIS W. HIGGINS, associated with the U. S. Rubber Co. since 1929, has been named sales manager of drug sundries, dipped goods and specialties in the Footwear and General Products Division of the company.

EDWARD V. BERGG, assistant to the works manager of the Henly Tire & Rubber Co., Ltd., Gravesend, England, is presently visiting the plant of the Armstrong Rubber Mfg. Co. at Des Moines, Iowa, where he is studying production methods. He has already spent four months at the Armstrong Rubber Co. in West Haven, Conn.

HENRY C. ROEMER, associated with the International Telephone & Telegraph Co. since 1927, has been elected president of the Federal Telephone & Radio Corp., manufacturing associate of I.T.&T.

NORMAN M. GODFREY, associated with Hewitt-Robins Inc. since 1937, has been named manager of the Eastern Sales Division of the company with headquarters in New York.

W. F. TWOMBLY, vice-president of the Witco Chemical Co., was elected a director of the company at a recent meeting of the board of directors in Chicago, Ill.

JAMES F. O'BRIEN, associated with the Baker Castor Oil Co. since 1945, has been named sales representative covering all counties of New York State except Kings, Queens, Nassau, Suffolk, Chautauqua, Erie and Niagara.

S. ERNEST KULP, member of the board of directors and of the Executive Committee of the Masland Duraleather Co., has been elected president of the Plastic Coatings and Film Association.

G. V. MIGULA, formerly associated with Migula & Co., has joined Hewitt-Robins Inc. as manager of its Western Sales Division with headquarters in San Francisco, Calif., succeeding J. H. HAYDEN, who has retired.

E. H. JOHNSON, executive engineer of the Farrel-Birmingham Co., Ansonia, Conn., recently arrived in Paris, France, to begin a two-month inspection tour of the continent.

ROBERT W. MUNSON, formerly assistant district sales manager of the New Jersey Zinc Sales Co. at San Francisco, Calif., has been named district sales manager.

ALAN L. GRANT, associated with the Charles T. Wilson Co., Inc., and SAMUEL SWERLING of Swerling Bros., have been elected to the board of governors of the New York Commodity Exchange, Inc., to represent the Rubber Group.

LOUIS J. COPPOLA, associated with the U. S. Rubber Co. since 1925, has been appointed manager of government sales for the Mechanical Goods Division succeeding GEORGE H. PENDLETON who has retired from the company after 46 years of service.

FRANKLYN I. EMMETT has been named sales manager of the Footwear Division of the Tyer Rubber Co., Andover, Mass.

IRA S. HURD, formerly sales manager of the Textile Chemical Department of the Warwick Chemical Co., a division of the Sun Chemical Corp., has been named sales manager of Warwick Chemical.

FRED A. MAYFIELD, rubber broker and former president of the Better Business Bureau, Akron, Ohio, has been elected chairman of the group's board of directors.

DAN CHOVAN, formerly associated with the Roth Rubber Co., Cicero, Ill., has joined the Fawick Flexi-Grip Co., Akron, Ohio.

J. E. STONIS, formerly technical sales representative for the C. P. Hall Co. at Chicago, Ill., has been appointed sales manager of the C. P. Hall Co. of Illinois.

Reclaimers Elect 1952 Officers

Fred Traflet
Named President of Rubber Reclaimers for 1952

At the recent annual meeting in New York City, the Rubber Reclaimers Association elected new officers for the 1952 season. Members of the association elected to office are: *President*, Fred Traflet (Pequanoc Rubber); *Vice-President*, Gilbert K. Trimble (Midwest Rubber Reclaiming); *Secretary-Treasurer*, Charles T. Jansen (RUBBER AGE). Jean H. Nesbit (U. S. Rubber Reclaiming) was re-appointed chairman of the Executive Committee. The following association members were elected to the new board of directors: R. E. Casey (Naugatuck Chemical), Irving Laurie (Laurie Rubber Reclaiming), C. R. Shaffer (Xylos Rubber), D. S. Morse (Bloomingdale Rubber) and Gilbert K. Trimble.

JOHN A. PORTEOUS, associated with the Dominion Rubber Co., Ltd., for the past 26 years, has been appointed director of sales of United States Rubber International, new export subsidiary of U. S. Rubber. Mr. Porteous succeeds H. J. KORKEGI, who has been named regional director, Far East.

CLINTON B. MCKEOWN, associated with the B. F. Goodrich Co. for the past 15 years, has been named technical superintendent of the Aeronautical Products Division of the company.

CARL PACIFICO, formerly a member of the field service staff of the Wyandotte Chemicals Corp., Wyandotte, Mich., has been appointed director of the Development Department of the company.

JAMES L. HYATT, director of purchases for the Falls Engineering & Machine Co., Cuyahoga Falls, Ohio, has been elected secretary and a member of the board of directors of the company. He will continue to head the Purchasing Department for the company.

DR. GEORGE O. CURME, JR., vice-president in charge of research of the Union Carbide and Carbon Corp., has been elected a director of the company succeeding the late JAMES A. RAFFERTY.

FINANCIAL NEWS

FIRESTONE PROFITS AT NEW HIGH WHILE SALES VOLUME RISES 41%

Sales and profits of the Firestone Tire & Rubber Co. in the fiscal year ended October 31, 1951, were reported as the greatest in the company's history. Sales for the year totaled $973,766,455, 41% greater than the $694,713,817 reported in the previous fiscal year. Net income jumped over 45% to $48,398,950, which is equal to $12.26 a share on the present larger number of common shares outstanding after a two-for-one stock split last September. On the same basis, the 1950 fiscal net of $33,267,561 was equal to $8.38 a common share.

As of October 31, 1951, the company listed total current assets of $318,467,376 and total current liabilities of $117,308,920. At the end of the preceding fiscal year, total current assets were $247,638,461, while total current liabilities were $72,294,336.

1951 Plant Improvements

Firestone spent $86,580,907 for improvements on plant and equipment in the 1951 fiscal year, compared with $28,100,100 in the previous fiscal year. Major additions were made to plants in Des Moines, Iowa; Los Angeles, Calif.; Memphis, Tenn.; Pottstown, Penna.; Fall River, Mass.; and Noblesville, Ind.

As a result of this expansion, the report says, capacity has been increased for the production of passenger car, truck, tractor and earth-mover tires; foam and reclaimed rubber; Velon plastic fibers and basic resins for plastics; industrial products and defense products.

The report states that natural rubber production of the Firestone plantations in Liberia was increased to 72,588,225 pounds. Because of this increased output, and the fact that the world price of natural rubber reached the highest peak in 25 years, the plantations accounted for a larger portion of company profit.

Sales of Firestone products outside of the United States increased substantially during the fiscal year 1951, and the company's overseas factories operated at peak production. Exports from domestic factories also increased. Harvey S. Firestone, Jr., chairman of the board, stated that the company enters the new year in the strongest position in its history.

Boston Woven Hose & Rubber Co.

First Quarter: Net income of $230,489, which is equal to $2.44 a common share, compared with $270,521, or $2.91 a share in the first quarter of the preceding fiscal year. Sales in the first quarter of the 1952 fiscal year totaled $5,412,728, against $5,112,507 in the first quarter of the 1951 fiscal year.

Dayton Rubber Co.

Year ended October 31: Net profit of $2,380,938, which is equal to $5.01 per share on the common stock after providing $2.00 per share dividends on Class "A" Preference Stock. This compared on the same basis last year to net profit of $2,241,015, or $4.74 per share. Net sales in the year ended October 31, 1951, totaled $54,602,954, 47% more than the net sales of $37,199,454 in the previous fiscal year. At the end of the 1951 fiscal year, current assets were $17,091,008, while current liabilities were $8,323,953. On October 31, 1950, current assets were $13,212,477, while current liabilities were $6,211,145.

Lee Rubber & Tire Corp.

Year Ended October 31: Net profit of $2,185,632, or $8.62 a share, compared with $2,944,732, or $11.61 a share, for the year ended October 31, 1950. Consolidated net sales increased 28% to $50,402,400 for the 1951 fiscal year, against $39,308,489 for the preceding fiscal year.

Midwest Rubber Reclaiming Co.

Year Ended October 31: Net income of $650,453, which is equal to $2.05 a common share, compared with $830,446, or $2.68 a share in the previous fiscal year. Net sales in the year ended October 31, 1951, amounted to $9,020,597, against $6,631,692 in the preceding year.

A. G. Spalding & Bros., Inc.

Year Ended October 31: Net income of $1,220,132, which is equal to $2.34 a share, compared with $1,023,384, or $3.12 a share in the previous fiscal year. Sales in the year ended October 31, 1951, totaled $23,899,635, against $22,830,886 in the year ended October 31, 1950.

More Plastics Exposition Data

Exhibit space for the 5th National Plastics Exposition, to be held in Philadelphia, Penna. on March 11 to 14, was virtually sold out more than two months in advance of the event in spite of two successive increases in total space allotted. Current reservations number 135. The exposition is sponsored by the Society of the Plastics Industry, Inc. All phases of the plastics industry are entered including scores of user industries — molders, laminators and fabricators — as well as manufacturers of plastics, chemicals and equipment used in the plastics industry. The Bellevue-Stratford Hotel in Philadelphia has been designated as headquarters for the exposition which will be held in Convention Hall. SPI meetings during the exposition will take place in the ballroom adjoining Convention Hall.

Goodrich "Turnover" Conveyor

Developed jointly by the B. F. Goodrich Co. and the Chain Belt Co. of Milwaukee, Wisc., a new conveyor system featuring a "turnover" arrangement of the belts is said to make practical year-round operation of conveyor belts. The new conveyor system enables the belt to turn itself over after delivering its load. Thus, the clean side of the belt always runs on top of the return idlers; cannot clog or cause damaging buildup of tacky materials on idlers or pulleys. Before accepting a new load, the belt takes another twist so that the same carrying surface as before receives the load. This action is accomplished by positioning two twist pulleys at each end of the system. It is an easy matter to convert any conventional belt conveyor system into the turnover type, Goodrich states. Sticky material cannot accumulate on rotating metal parts of the system and wet materials can be handled at sub-zero temperatures without danger of the belt freezing to pulleys and idlers. With this system, clean-up problems as a result of spillage are said to be lessened, and the use of deck plates to protect the return run is eliminated. Any spillage onto the lower run is carried to the tail end and automatically dumped, for subsequent reclaiming. The system is recommended by Goodrich wherever messy, sticky materials must be handled.

Enlarges Research Activities

Koppers Co., Inc., Pittsburgh, Penna., will embark on an enlarged and more uniform program of research, with a major portion of such work centered at Verona, Penna., where new laboratories are now nearing completion. The company has purchased a plant site it formerly leased at Verona, re-arranged its buildings and added a new building which will contain administrative offices, the company's research library and conference rooms. Company officials explained that the new Verona center not only will provide enlarged and improved laboratory facilities but is designed to allow extensive pilot plant work to be carried on. One large area will be devoted to pilot plant work in chemicals, another in fuels and a third in testing and improving of large machinery which the company makes. It is expected that by 1953, there will be nearly 200 chemists, physicists, engineers and technicians working at Verona.

More Certificates of Necessity

The Defense Production Administration has issued a new list of approved Certificates of Necessity for accelerated tax amortization on new or expanded defense facilities. Certificates issued recently include:

Monsanto Chemical Co., Springfield, Mass., $1,190,000 for the production of polyvinyl chloride resin.

Whitney Blake Co., Hamden, Conn., $73,329 for field wire.

General Cable Corp., Bayonne, N. J., $365,980 for field wire.

Monsanto Chemical Co., Texas City, Texas, $7,340,000 for vinyl chloride.

URW Calls Pay Policy Meeting

The Wage Policy Committee of the United Rubber Workers, C.I.O. will meet in Cleveland, Ohio on March 17, to consider the possibility of formulating an economic program. L. S. Buckmaster, president of the union, said this consideration will be based upon "existing conditions and possible circumstances which may develop in the immediate future." He refused to comment, however, on how much, if any, the union may seek in the way of higher wages. He said, however, that the 13c an hour increase rubber workers received last year was "goldded up" long before the Wage Stabilization Board approved the raise. Union leaders are reported to figure that the basis on which the WSB granted the increase serves as a good argument for them to demand higher wages now. Mr. Buckmaster pointed to the rising cost of living and said "by the time we get into actual negotiations, it may go up some more." Union leaders also point to the net profits reported by the rubber companies as another reason why they believe they should get higher wages this year. Besides considering the economic program, the committee, Mr. Buckmaster said, will discuss other collective bargaining contract provisions of "general interest to members of the union." The entire labor-management contracts between the URW and the B. F. Goodrich Co. and the Firestone Tire & Rubber Co. expire this summer.

Knighthood for Eric Miller

H. Eric Miller, one of the most widely known executives in international rubber circles, was among those upon whom a knighthood was conferred in the recent New Year Honors list announced in England. Mr. Miller has been associated with Harrisons and Crosfield, Ltd., since 1899, and has been chairman of the board of that organization since 1924. He is also chairman of several other companies with rubber plantation interests as well as of the International Rubber Development Board, the British Rubber Producers' Research Association, and the International Rubber Research Board. He is a member of the council and past president of the Rubber Growers' Association and a Fellow and vice-president of the Institution of the Rubber Industry.

Marathon Low-Pressure Tire

A further addition to its line of low-pressure tires was recently revealed by the Goodyear Tire & Rubber Co. with the announcement of a new and lower priced unit. Termed the "Marathon", the new tire incorporates the same basic principles as the firm's original low-pressure unit, the "Super-Cushion", which was introduced by Goodyear in 1947. The new Marathon, however, was designed to meet popular demand for a lower priced replacement tire, rather than as an original equipment unit. Goodyear also points out that the new tire has exceptionally good tread wear characteristics for its quality level. The Marathon is made in all the popular low-pressure sizes from 6.40 through 7.60.

Dinsmore Named Foundation Lecturer

Dr. R. P. Dinsmore

The Midland Section of the Institution of the Rubber Industry has announced that Dr. R. P. Dinsmore, vice-president in charge of research and development for the Goodyear Tire & Rubber Co., has accepted an invitation to give the 7th Annual Foundation Lecture at Wolverhampton, England, on May 23. Dr. Dinsmore will speak on "Economic and Physical Aspects of GR-S Modification." Following his address, a dinner will be served.

New Carbon Disulfide Facilities

New carbon disulfide manufacturing facilities costing more than $500,000 are nearing completion at the plant of the Taylor Chemical Division, J. T. Baker Chemical Co., Penn Yan, N. Y. The facilities are part of a long range expansion and modernization program designed to meet the needs of many industries. Carbon disulfide is widely used in the rubber and rayon industries, and in the manufacture of carbon tetrachloride, cellophane, dyestuffs and other products. Focal point of the new equipment is a recently constructed $100,000 electrothermal furnace, an addition to the three other furnaces now in use. Also included in the program are improved storage and handling facilities and a new unit built especially to recover valuable sulfur from waste gases.

Increases Red Iron Oxide Output

Added production facilities and new exclusive processing methods have enabled Stabilized Pigments, Inc., Piscataway, N. J., to increase their output of pure red iron oxide from 80 to 200 tons a month. The company states that theirs is the only process that takes the wet iron sulfate by-product and handles it at a constant rate through continuous roasting operations at controlled temperatures. The result is a uniform pure red iron oxide of the highest quality, the company states, ranging from yellow red to bluish red tones. Red iron oxide produced by Stabilized Pigments is distributed by Whittaker, Clark & Daniels, Inc., New York, N. Y.

To Market German Type Cable

The Phelps Dodge Copper Products Corp., New York, N. Y., has announced that it has started to market a new type of coaxial cable that employs aluminum as the outer conductor and sheath. The cable is said to be cheaper than that previously available for micro-wave use and is considerably more efficient. At present, the cable is being produced by Felten & Guilleaume Carlswerk of Cologne, Germany. Phelps Dodge officials said that when equipment is installed, the company plans to make the cable in the United States. For micro-wave use, the cable is built with a central conductor held in the exact center of the outer sheath by a spiral of interior insulation tape. This "Styroflex" tape for use in the cable will be manufactured by the National Varnished Products Corp., Woodbridge, N. J. The new cable is in use in more than 150 installations in Europe. Phelps Dodge officials said that so far, only the German firm has been able to extrude a continuous length of aluminum pipe in which a conductor may be placed. Through an agreement with that concern, the new aluminum sheath extrusion process will be made available to Phelps Dodge.

Electronic Rubber Co. Expands

Electronic Rubber Co. of Stamford, Conn., is expanding its facilities to include the manufacture of polyvinyl chloride injection molding and extrusion compounds for non-electrical uses. The company is said to have pioneered in the development of high temperature performance vinyl compounds for wire insulation. A major factor in its success has been its ability to control closely the quality of its compounds through the development and use of unique slow compression, heat deformation and air oven aging tests. Electronic Rubber was one of the first in the industry to develop a 105° C. wire compound which was approved by Underwriters' Laboratories. This compound was based on a Marvinol VR-10 formulation produced by the Naugatuck Chemical Dirtical field, the company expects to confine itself to compounding vinyl for specific uses. The company is also evaluating several new compounds for use in the manufacture of dolls, shoe welting, non-toxic beverage tubing, belting and cartridge clip covers.

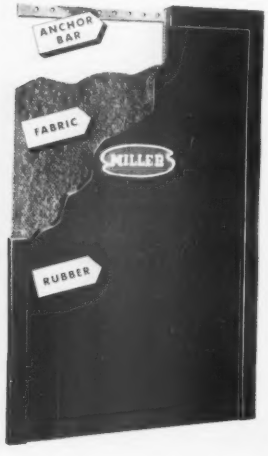
Spector To Sell Mold Lubricants

The firm of Daniel L. Spector, 2607 Talbot Road, Baltimore 16, Md., has obtained exclusive manufacturing and sales rights for "Piomar" and "Pio-Con", the patented formula mold lubricants. Use of Piomar is said to prevent sticking when molds are released. It will also provide a uniform finish. Pio-Con has an organo-silicone base. This product is an emulsion that glazes hot surfaces to give easy release from curing molds, and a high gloss finish on slabs. Merit Western Co., 1248 Wholesale St., Los Angeles 21, Calif., is acting as West Coast representative for Daniel L. Spector.

NEW RUBBER PRODUCTS

Miller Truck Fender Flaps

To help meet the great new splash guard demand created by the passing of state laws across the country, the Associated Tires and Accessories Division of the B. F. Goodrich Co. is now marketing truck and trailer fender flaps under the "Miller" brand. The Miller flap features an anchor-locking steel bar in the extra-heavy top section for safe attachment, and 1¼-inch



edge ribs down the side of the flap to combat wind bend. The rib is omitted along the bottom to avoid heavy collection of mud, snow and ice. A full two feet wide to cover dual wheels, the Miller flaps come in 30, 36 and 40-inch lengths. Two grades are offered. Heavy duty "DeLuxe" made with a layer of heavy cord fabric between two layers of heavy rubber stock impregnated with tough tire cord; and the heavy duty "Standard," made of full-molded rubber, impregnated with tire cord. The cutaway view above shows the "DeLuxe" fender flap with its layer of cord fabric and 14-gauge steel anchor-locking bar molded between two layers of rubber.

Manhattan Develops New Expander

Development of a 3-inch diameter rubber-covered roll-type expander for textile plants has been announced by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. The expander is designed to meet requirements of every fabric from light rayons to duck or tire cord fabrics and rolled sheet plastics. In addition to requiring a minimum of space because of its small diameter, the Manhattan expander turns easily under low or high tension. Metal parts are of stainless steel construction, and with a thick, high quality rubber roll cover, provide an expander that is resistant to corrosive conditions found in dyehouses and bleacheries.

Goodyear Plastic Air Filter

A washable, plastic air filter for forced draft hot air furnaces and air conditioning systems, capable of catching pollen from the air and even the most minute solids in cigarette smoke, has been developed by the Goodyear Tire & Rubber Co. The new filter is described as a self-charging electrostatic unit which takes useful advantage of the dielectric properties of certain plastic films, resins and waxes. The material used in the filter is a thin polyethylene film, shredded into a porous mass, which when exposed in a current of air picks up an electrostatic charge. This charge attracts and retains the finest of dust, soot or smoke particles which may be suspended in the air.

Molded Latex "Kaysam Kuties"

Shown below are two in a line of new molded latex toys produced by Molded Latex Products, Inc., Paterson, N. J. Called "Kaysam Kuties," the new items are said to combine the best features of

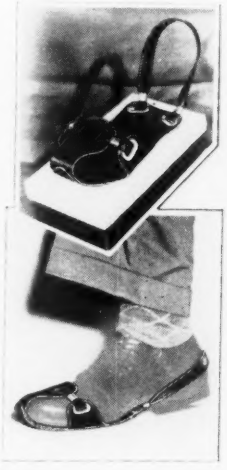
squeeze and stuffed toys. All have moveable heads and concealed voices. The heads of the toys are molded of soft vinyl plastic while the bodies are foam-stuffed latex. Each stands 12 inches high. Unbreakable and easily washed, the toys are gaily decorated. The line includes "Cub," "Pup," "Bunny," and "Lamb."

Decorative Rubber Matting

A new rubber matting with a geometrical design which is highly decorative, non-slip and said to have excellent foot cleaning properties has been developed by the U. S. Rubber Co. The new matting has a unique three-dimensional pattern which combines attractiveness with practicality. It is suitable for use in hotels, theaters, cocktail lounges, and restaurants as well as in the home. It can also be used as a protective matting in automobiles. The product is available in standard size mats of 24 by 30 inches or by the yard in 30-inch widths. It comes in four colors, black, maroon, red and green.

Tigerfoot Safety Sandal Device

Tigerfoot Sales Inc., 1155 Oswego Blvd., Syracuse, N. Y., is presently marketing the "Tigerfoot Sandal", a unique safety device designed to provide sure footing. Similar to an ordinary sandal in appearance, this new product is slipped on over a regular shoe. The sandal is held in place by means of rubber straps which extend over back and front and around



the toe of the shoe. The straps are secured by clamps while all openings are secured by grommets. The topside of the sandal, that portion worn next to the sole of the shoe, is composed of sheet rubber in which fabric or cord has been inserted. The underside of the sandal, that portion next to the floor, is composed of a special abrasive material known as "Foothold". The abrasive material, a grit held in bond by water, oil, and an acid-resistant material, is cemented to the sheet rubber by a special water and oil-resistant rubber cement. This abrasive material is the same as that used by the U. S. Navy to prevent slipping about gun mounts and on stair treads. In use, the sandal has been found to be particularly useful where the user is likely to come into contact with wet, greasy or slippery surfaces.

Aktoy Molded Latex Toys

Aktoy Manufacturing Co., 1035 Post St., San Francisco 9, Calif., is producing a new line of natural latex molded

toys. All the toys are manufactured with fast, non-toxic rubber base colors and built-in squeakers. Among the items in the line are "Suzy" the pup, "Tubby" the bear, "Mimi" the kitty, "Jumby" the elephant, "Snooty" the duck, and a unique pop-up toy called "Squeeze-Me."

LEADING SUPPLIERS TO THE RUBBER, PLASTICS AND ALLIED INDUSTRIES ·

LOS ANGELES NEWS

The Los Angeles Rubber Group began the celebration of its 25th year by having the February 5th meeting, the first of the year, sponsored by the past chairmen of the group. The speaker of the evening was to have been Dr. Fred D. Fagg, Jr., president of the University of Southern California, who was to have spoken on the subject "Free Enterprise".

The technical session was arranged by N. R. Pestal (Firestone), and featured an address by Edward V. Osberg, assistant manager of the Chemical Division, General Tire & Rubber Co. Mr. Osberg was to have spoken on "Polygen — A New Class of Synthetic Rubbers". A full report on the meeting will appear in the March issue of RUBBER AGE.

Commercial Rubber Co. has completed a program of plant expansion and renovation. A new structure at 1659 East 23rd St. in Los Angeles consists of 1200 square feet of office space and approximately 5500 square feet of finished goods storage, warehouse and shipping facilities. The former plant floor area at 1601 East 24th St. has been resurfaced. A new and larger conveyor system has been installed which will permit the company to produce retreading stocks of far greater width than was formerly possible.

Austin H. Herbst (Irvington Varnish & Insulator) recently won the signal honor of winning first prize for the Southern California Section and third prize in the national competition for the best technical paper in a contest sponsored by the Society of Plastics Engineers.

The Los Angeles Rubber Group has announced the new board of editors for the "TEARGI News", for 1952. L. E. Budnick (Ohio Rubber) is the new editor and business manager. H. H. Thompson (Xylos Rubber) is the associate editor. H. V. MacDonald (Pacific Hard Rubber), J. L. Ryan (Goodyear) and J. B. Kertson (B. F. Dougherty) are assistant editors.

New Tax Charges Filed on Davis

As reported in the January issue of RUBBER AGE, Poncet Davis as president of the Robbins Tire & Rubber Co. of Tuscumbia, Ala., has been charged by the federal government with avoiding the payment of $201,000 in corporate and excise taxes. This charge is now before the Birmingham, Ala., Federal Grand Jury, while Mr. Davis is free in $5,000 bond. New charges have now been filed against Mr. Davis which state that he defrauded the government of $170,056 in 1945 income taxes. These charges have been referred to the Cleveland, Ohio, district Federal Grand Jury. In this latter case, Mr. Davis waived preliminary hearing and posted another $5,000 bond. In the Cleveland case, Mr. Davis is accused of listing $53,000 in personal income in 1945 and paying $29,500 in taxes when, the government charges, he actually earned $240,000 on which the additional $170,000 should have been paid. Mr. Davis said the full facts will show that he had no intention of avoiding his taxes.

Pictured above are the 1952 directors of the Los Angeles Rubber Group. Seen in the front row are: D. C. Maddy (Harwick Standard); R. L. Short (Kirkhill Rubber); Dixon Sheppard (Goodyear); and F. C. Johnston (Caram Mfg.). In the back row are: L. E. Budnick (Ohio Rubber); Charles Kuhn (Master Processing); R. D. Abbott (R. D. Abbott); R. F. Bitter (Goodrich Chemical); and George Miller (W. J. Voit).

CANADIAN NEWS

More than 1,000 chemists and chemical engineers are expected to attend the 35th Annual Conference and Exhibition of the Chemical Institute of Canada to be held on June 2, 3, and 4 in Montreal, Que. All activities of the conference including the exhibits will be in the Mount Royal Hotel in that city. A feature of the conference will be exhibits of the latest developments in chemicals, laboratory and processing equipment, and supplies.

Outstanding scientists and industry executives will present papers at the technical sessions and special functions. Technical topics will include papers on chemical engineering, analytical chemistry, protective coatings, organic and physical chemistry, rubber and high polymer chemistry and other subjects.

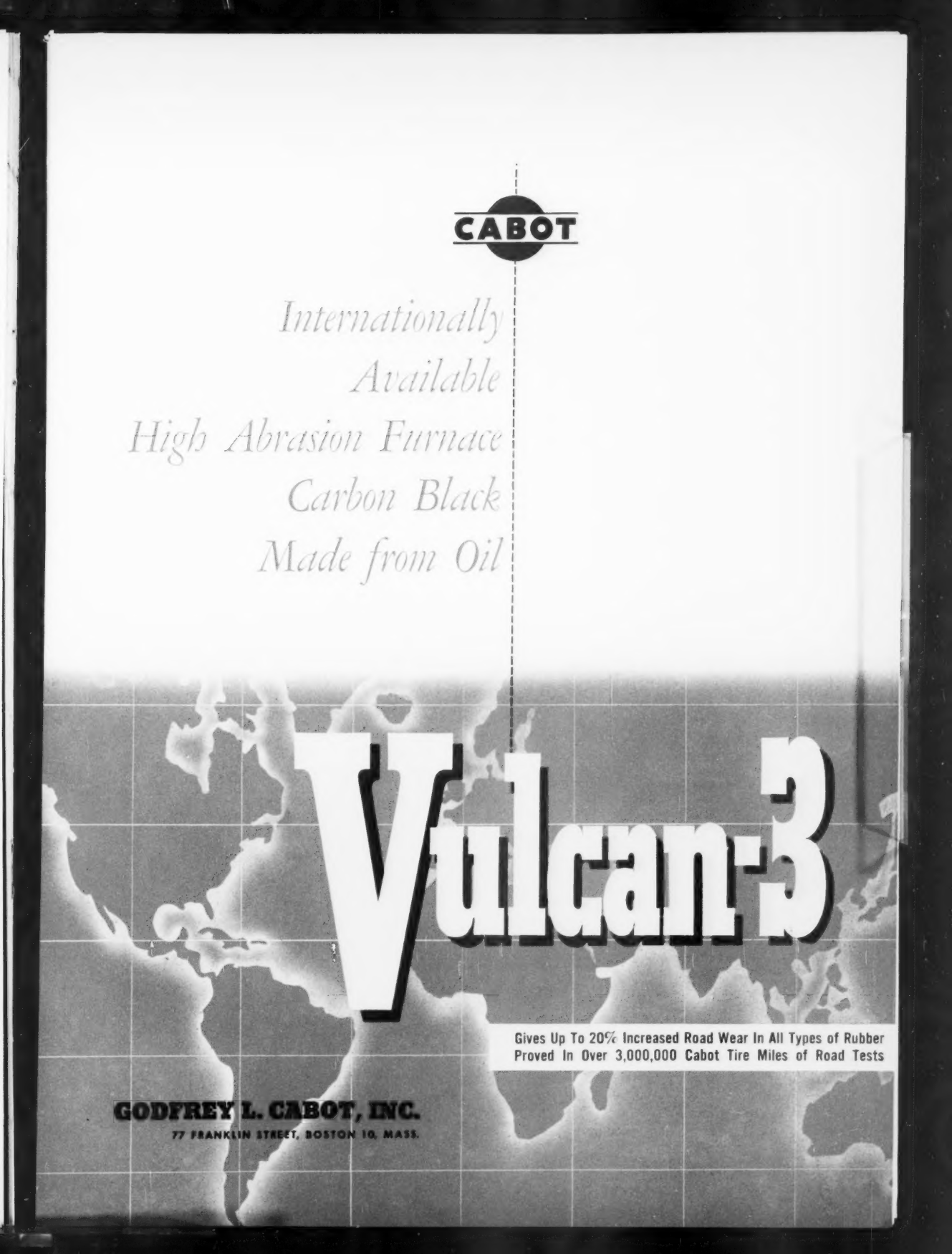
Special events will include the presentation of the Chemical Institute of Canada Medal to an outstanding scientist; the paper of the Westman Memorial lecturer; plant tours, and a golf tournament. At the annual business meeting on June 2, new officers for the 1952-53 season will be announced.

Canadian Resins and Chemicals, Ltd., has announced plans to construct a $2,500,000 plant for the production of a type of vinyl resin now imported. The plant will be located at Shawinigan Falls, Que., and will be operated by the company's Vinyl Chloride Resin Division. Construction of the new plant, seventh to be built at Shawinigan Falls since the company was established in 1941, will begin early this spring and will be completed in 1953. The company has presently under construction a new $1,000,000 calender line for the Compounding Division.

R. G. Davis, associated with Canadian Industries, Ltd., since 1945, has been named sales representative in the Toronto, Ont., district succeeding J. L. G. Bell. Pat Fuller, who joined the company in 1951 after graduation from the University of Alberta, has been named to succeed Mr. Davis as sales representative in the Montreal, Que., district. Mr. Bell, associated with the company since 1943, has been named sales promotion manager of the Chemical Department with headquarters in Montreal.

Receive Management Awards

Four companies in the rubber industry have been awarded Certificates of Management Excellence for the year 1951 by the American Institute of Management, New York, N. Y., a non-profit foundation devoted to the study and improvement of corporate organization and management. The firms receiving the award include: Firestone Tire & Rubber Co., B. F. Goodrich Co., and Goodyear Tire & Rubber Co., all of Akron, Ohio, and Raybestos-Manhattan, Inc., Passaic, N. J. This is the second time these companies have been cited "excellently managed" by the Institute.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77 FRANKLIN STREET, BOSTON 10, MASS.

OBITUARIES

Raymond C. Gaugler

Raymond C. Gaugler, president of the American Cyanamid Co., New York, N. Y., died at a hospital in New Rochelle, N. Y., on January 11. He was 59 years old. Born in Pittsburgh, Penna., Mr. Gaugler received his education at parochial schools in that city, and at Duquesne University. Before joining American Cyanamid, Mr. Gaugler was with the United States Aluminum Co. and the Northern Aluminum Co. He joined American Cyanamid in 1917, served as assistant treasurer and comptroller, and was named treasurer in 1929. In 1939, he became vice-president in charge of finance and in 1947 was named executive vice-president. Mr. Gaugler was elected president of the company on January 5, 1951. He had been a director of the company since 1929. Mr. Gaugler was a director of several companies associated with American Cyanamid. These included the Jefferson Chemical Co., Southern Minerals Corp., Southern Petroleum Corp. and Southern Pipe Line Corp. He was also a director of several American Cyanamid subsidiaries, including North American Cyanamid Ltd., Chemical Construction Corp., Davis & Geck, Inc., and the Berbice Co., Ltd. In addition to his company activities, Mr. Gaugler was a director of the Guaranty Trust Co. of New York. He was also a vice-president, member of the Executive Committee, and director of the Manufacturing Chemists Association. Mr. Gaugler was active in the affairs of the National Industrial Conference Board. He is survived by his wife and four daughters.

John G. Aldrich

John G. Aldrich, president of the New England Butt Co., manufacturer of braiding and insulating wire machinery at Providence, R. I., died on January 20 in Rhode Island Hospital in that city. He was 87 years old. Mr. Aldrich was a well-known artist, and his water colors, chiefly of landscapes and country scenes, were exhibited often at the Providence Art Club. Mr. Aldrich was a member of the American Society of Mechanical Engineers and the Providence Engineering Society. He is survived by three sons and his sister.

John C. Lauritzen

John C. Lauritzen, well-known inventor and manufacturer of tire manufacturing devices a number of years ago, died on December 6 at his home in Akron, Ohio. He was 78 years old. Born in Denmark, Mr. Lauritzen had lived in Akron and near vicinity for 35 years. He was a Mason and a Moose. Services were held on December 8 with interment in Evergreen Hill Cemetery, Chagrin Falls, Ohio.

Thomas R. Dawson

Thomas Rayner Dawson, head of the Intelligence Division of the Research Association of British Rubber Manufacturers, died on December 16 at the age of 62. Born on November 28, 1889, Mr. Dawson was graduated with 1st class honors in chemistry at Leeds University in 1913. In January, 1921, he joined the staff of the RABRM and was at the time of his death the earliest member still left with the association. He soon gained an outstanding reputation for the intelligence service and library on rubber which was built up at Croydon, England. The methods he used in rubber literature documentation came to be known as the "Dawson" system. Mr. Dawson was a vice-president of the Institution of the Rubber Industry, in which organization he had long been active. He was the author of several valuable reference works including the "Overall Report on the BIOS Investigations of the German Rubber Industry." He was joint author with B. D. Porritt of "Rubber, Physical and Chemical Properties," and had been editor since 1926 of the RABRM "Summary of Current Literature." Recently, he had done much valuable work towards the compilation of the "History of the Rubber Industry", the publication of which he did not live to see. He is survived by his wife and daughter who is a member of the staff of the RABRM library.

William B. Wescott

William Burton Wescott, patent attorney who held a number of patents in the fields of adhesives, rubber latex and lithographic duplication processes, died on January 19 in University Hospital, Philadelphia, Penna. He was 68 years old. Mr. Wescott had been associated in the early development of color motion pictures. Between 1919 and 1921, he worked with Professor Daniel F. Comstock, first in the Department of Theoretical Physics at Massachusetts Institute of Technology, and then as a partner in Comstock & Wescott, Inc., which later became Calmus, Comstock & Wescott, consulting engineers of Cambridge, Mass. The work covered by patents granted to Mr. Wescott and Dr. Comstock was the genesis of the color motion picture process. In the rubber field, Mr. Wescott held patents on heel and sole formulations, rubber-asbestos mixtures and coagulation methods. An expert archer, he was past president of the National Field Archery Association and an honorary member of the National Archery Association and holder of its medal of honor. He was also a member of the American Chemical Society, the Royal Photographic Society of Great Britain and the Chemists Club of New York. His wife survives.

James V. Blake

James Vinton Blake, retired natural rubber broker, died at his home near Akron on December 27. Mr. Blake, 72, had been in ill health for the last few years. He formerly maintained his own brokerage office in Akron, retiring about 20 years ago. Born in Maryland, Mr. Blake attended Kenyon College in Gambier, Ohio, from which he was graduated with Phi Beta Kappa honors in 1900. During his active business career, Mr. Blake was associated with both the B. F. Goodrich Co. and the Goodyear Tire & Rubber Co. With the latter, he served in Singapore and Ceylon purchasing natural rubber supplies. He established his own business in Akron in 1923. Services were held on December 29 in Akron with burial in Rose Hill Burial Park. His wife and two daughters survive.

Firestone Veloform F-10

A new fluorinated plastic resin which is said to be resistant to the most highly corrosive chemicals and impervious to salt, heat and moisture, has been developed by the Firestone Tire & Rubber Co. The new resin will be manufactured under the trade name "Veloform F-10." The product has already been specified by the U. S. Air Force as a protective coating for the exterior of large tank trailers used in transporting fuming nitric acid. Possessing properties considered unique in the protective coating field, Veloform F-10 can be applied as a lacquer. This gives it a decided advantage over other materials of this type having the same acid, heat and moisture vapor resistance, the company states. Application of Veloform F-10 is a simple brushing, spraying or dipping operation and it can be used on rubberlike materials, metals, wood and plastics. Because of its high moisture vapor resistance, the product is considered an ideal coating for electrical equipment such as resistors, capacitors and wiring which must be protected from the corrosive action of moisture and salt spray. Production is being used entirely for military and defense purposes at this time.

To Build Polyethylene Resin Unit

Construction of a major unit for the production of polyethylene resins has just been announced as an addition to the Texas City, Texas, plant of the Carbide and Carbon Chemicals Co., division of the Union Carbide and Carbon Corp., New York, N. Y. The National Production Authority has granted a Certificate of Necessity to the company, and appropriate government agencies are now cooperating in getting the other necessary priorities for construction material and equipment. The unit is scheduled to be in production by early 1953. The production process will involve the direct polymerization of ethylene at high pressure. The estimated production of the unit will be about 50,000,000 pounds a year. It is expected that the entire production of the Texas City unit will go into the defense effort.

DOUBLE-CHECKED ✓ CHEMICALS FOR THE RUBBER INDUSTRY

TETRAMETHYLTHIURAM DISULFIDE

AVAILABLE IN 3 FORMS

to meet your specific requirements

SHARPLES ACCELERATOR 52-0

Powder form, untreated.

SHARPLES ACCELERATOR 52-1

Powder form, treated with 2% mineral oil to reduce dusting and improve dispersability in mill-mixed stocks.

SHARPLES ACCELERATOR 52-9

Xtruded form. Treated with inert rubber-soluble binder. Free flowing, dustless, with improved dispersability.

USES:

Primary Accelerator
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Vulcanizing Agent

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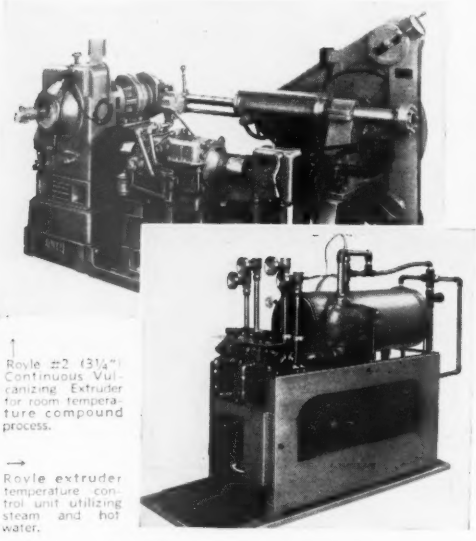
Of Particular Importance

To the Wire Insulating Industry

The room temperature compound process and associated equipment recently developed by the Western Electric Company, Incorporated, offer nine important advantages. These advantages begin with the storage of completely mixed, ready-to-extrude, rubber, GR-S, or Neoprene compounds and extend to a smoother and improved appearance for the finished product.

The complete extruder vulcanizing portion of the room temperature compound process is available to insulated wire producers* from John Royle and Sons who, for seventy-two years, have been building extruding machines to meet the most exacting process requirements.



↑ Royle #2 (3¼") Continuous Vulcanizing Extruder for room temperature compound process.

→ Royle extruder temperature control unit utilizing steam and hot water.

CHECK THESE ADVANTAGES:

- Improved diameter control
- Reduction in compound scrap
- Reduction in electrical faults
- Permits storage of completely mixed compounds
- Permits more economical scheduling of mixing equipment
- Eliminates "warm-up" operation
- Possible mill-room economies
- "Hot" machines may be converted
- Finished product has smoother finish—better appearance

Licensees of Western Electric Company

JOHN ROYLE & SONS
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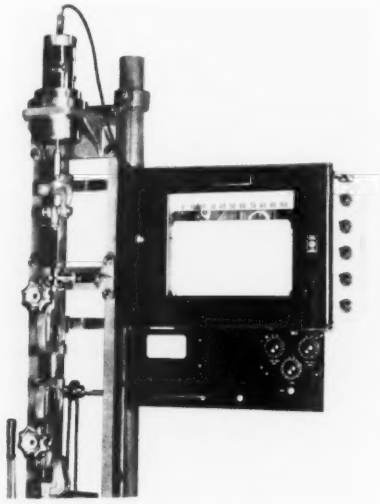
NEW EQUIPMENT

Inertialess Scott Weighing System

An entirely new electrical weighing system for use with existing Scott Testers of the pendulum type has been announced by Scott Testers, Inc., 185 Blackstone St., Providence, R. I. The new weighing system replaces the conventional pendulum type head and recorder, converting the tester from constant-speed-of-pull operation to constant-rate-of extension.



Resistance of the specimen, or load, is absorbed by the deflection of an elastic spool, which is converted to a voltage and measured by a potentiometer with recording chart. On the chart, extension of the specimen is shown vertically and load horizontally. Inasmuch as chart speed and clamp speed are both time functions, the chart becomes a stress-strain diagram directly, with either variable (load or extension) magnified or condensed as desired.

The advantages of the Scott Inertialess Weighing System are: First, as the name implies, inertia is practically eliminated from the weighing mechanism. The improved sensitivity reflects the behavior of the specimen in more minute detail, particularly when minute changes are magnified as described above. Second, it is now possible to apply a constant rate of extension (the elastic spool of the weighing head elongates only .0015" maximum, a negligible consideration). Third, the flexibility of drive and recorder rates and wide range of chart speeds available permit new studies of progressive test stages.

Application of the new system to existing Scott Testers is extremely simple. It may be installed on Models J, L, Q and X-3. The replacement, which can be made by non-mechanical personnel, requires about a half hour, consisting of removing the pendulum head by loosening

PUT IT TO WORK WITH THE PROPER MILL . . .

A BOLLING SPIRAL-FLOW INTENSIVE MIXER

THIS "TEAM" CAN DOUBLE, TRIPLE, PERHAPS EVEN QUADRUPLE YOUR PRODUCTION—AT A LOWER COST.

No. 4 Bolling Spiral-Flow Intensive Mixer for batch of approximately 150 pounds of 1.5 gravity, with 125 h. p. gear head motor on one-piece base.

Bolling mills are available in suitable sizes for the efficient, economical sheeting of rubber or plastics.

Write today for our new Bulletin "A-2".

Yes, sir, we mean just that! Bolling Spiral-Flow Intensive Mixers have been known to jump production 300% and cut mixing costs 70%. Bolling's 30-year background is ready to show you how you possibly can do likewise. These distinctive Bolling features will help:

1. Spiral-Flow steel sides which turbulate water or steam for hastening maximum heat transfer.

2. Split end frames for rigidity and quick accessibility.

3. Anti-friction bearings maintain true centers, reduce power maintenance and practically eliminate end play in rotors.

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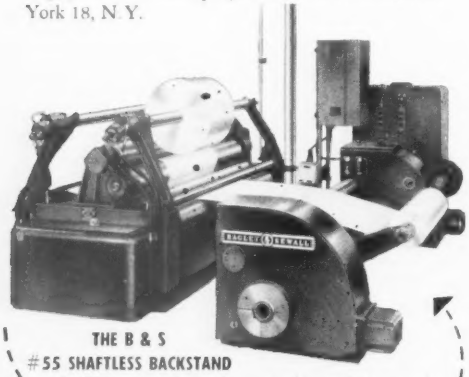
Cut Your Downtime
on mill roll changing
to 1 Minute or Less
with the NEW B&S
SHAFTLESS BACKSTAND

Money-consuming downtime on mill roll changing is cut to the bone by the wholly automatic B & S Shaftless Backstand. Here is what Mr. C. Carr Sherman, President of H. P. Smith Paper Co., has to say about this equipment:

"The engineering of this new unit indicates a fine understanding of the problems of the users of this type of equipment. The Backstand is much easier to handle as there are no shafts. It is also much easier and faster to make changes on it. I believe that changing rolls with this Backstand can be brought down to well under one half minute."

You may purchase the B & S Shaftless Backstand with or without the new B & S Slitter and Rewinder. The Backstand may be used on any type of rewinding equipment, as well as on waxing and laminating machinery, printing presses, etc.

For full details on the Shaftless-Backstand and the new B & S Slitters and Rewinders, write to The Bagley & Sewall Company, 500 Fifth Avenue, New York 18, N.Y.



THE B & S
#55 SHAFTLESS BACKSTAND
features automatic tension and side register control; motor for raising and lowering mill roll arms, also motor for moving the arms to accommodate different width rolls. Entire working mechanism is totally enclosed.

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WATERTOWN, NEW YORK
designers and builders of
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Foreign Representative: CASTLE & OVERTON, INC., 630 Fifth Avenue, New York 20, N.Y.

four bolts and installing the new elastic spool head with the same four bolts. With equal ease, the potentiometer recorder replaces the old recorder. Current is applied by plugging into any 110-120 Volt AC outlet.

In operation, the specimen is inserted in the tester clamps in the usual manner, and the chart pointer adjusted to zero for the existing tare load. The driving mechanism is then set in motion, extending the specimen by moving the lower clamp downward at a uniform predetermined rate of speed. At the same time, by synchronized automatic action, the chart paper commences its downward travel at its predetermined speed. For literal stretch recording, the speed of travel of the chart can be equalized with the speed of travel of the moving clamp. Travel speeds of .1" to 20" per minute are presently available.

As the specimen is extended, the elastic spool in the head weighs the load by its deflection. This deflection is reflected in the horizontal scale, graduated from 0 to 100, as illustrated. As previously mentioned, the maximum deflection of the elastic member under maximum lb. load plus tare is .0015", so that this has no practical effect on the recorded extension of the specimen. The accuracy of the system is $\frac{1}{4}$ of one per cent of the span, or better. Minimum zero drift is an important feature of control contributing to this high accuracy.

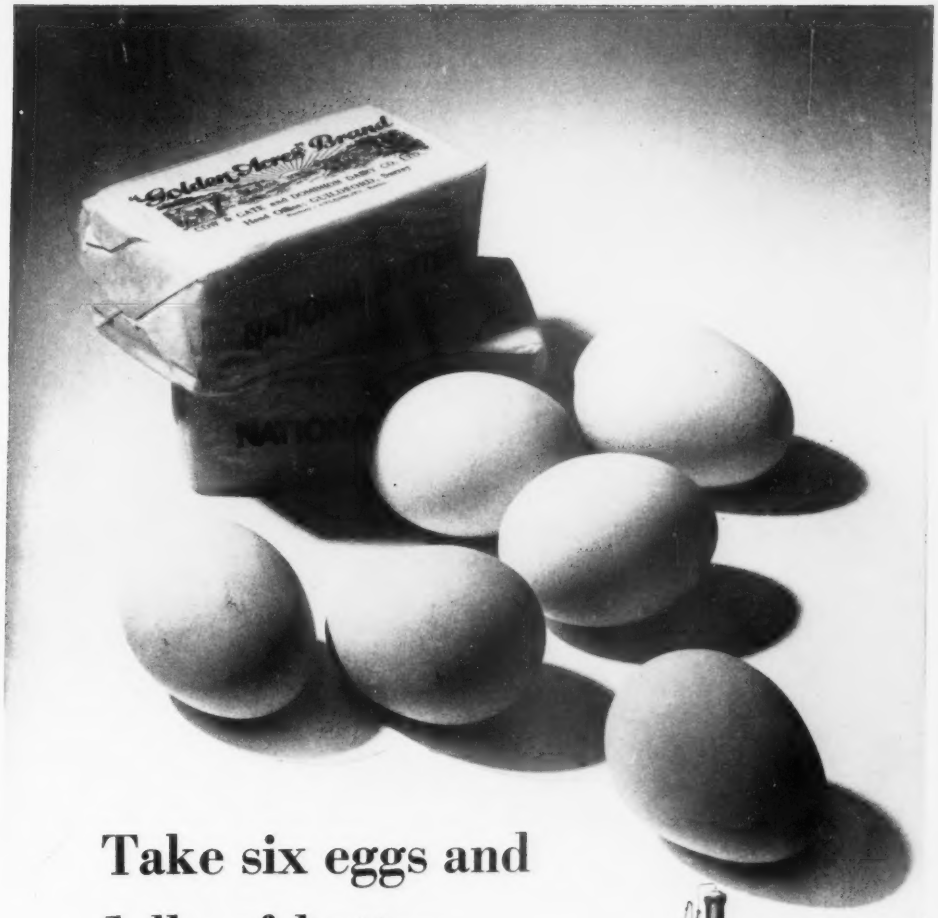
As to capacities, conversions are available from 2 to 10 lbs. to 400 to 2,000 lbs. The change from one capacity to another is readily accomplished by changing the elastic member rather than the entire head. This again can be accomplished by non-mechanical personnel, without special tools.

In summary, the Scott Inertialess Weighing System is a conversion kit for changing existing constant-speed-of-pull testers, in the field, to perform tests on the constant-rate-of-extension principle, with ability to compress or magnify either the load or extension on the recording chart.

New General-Purpose Pyrometer

A new general-purpose, low temperature model, portable pyrometer was recently introduced by the Claud S. Gordon Co., 3000 South Wallace St., Chicago 20, Ill. Known as Type LT-840 Xactemp, it is a self-contained instrument for rapid temperature determination below 800° C. The meter is precision built and enclosed in a finished, well balanced metal case with double-strength glass window. An integral, easy-grip handle makes it convenient to use in any position. It is of the high-internal resistance type for accuracy. A choice of four calibrations allows the most effective use of the scale range.

Available for use with the instrument are two needle thermocouples, a ribbon thermocouple, a surface tip thermocouple, and other specially designed thermocouples and extension arms. These are easily interchangeable and, without any adjustments or recalibration of the instrument, quickly ready it for measuring the surface temperature of stationary and revolving rolls, flat and irregular surfaces of molds, dies, etc., in rubber and paper making, plastic materials, wax, oils, greases, and other semi-fluid materials. The compact design makes the instrument ideal for field service, laboratory, and production-line service.



Take six eggs and 1 lb. of butter

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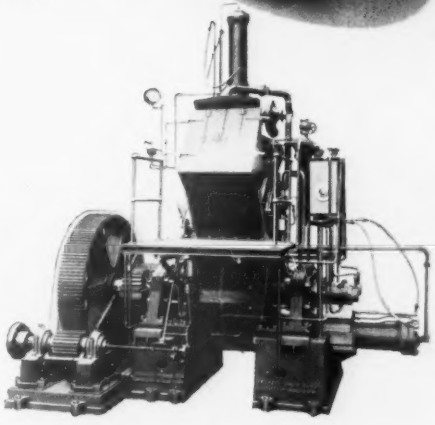

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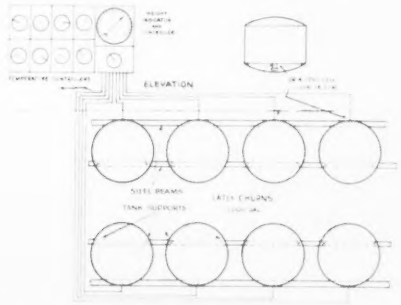
Automatic Weighing of Foam Batches

To assure accuracy in weighing raw materials for foam rubber products, eight 2,000-gallon latex churns in the Woonsocket, R. I., plant of the U. S. Rubber Co. have been equipped with a Baldwin weighing system utilizing eight SR-4 load cells of 10,000-lb. capacity



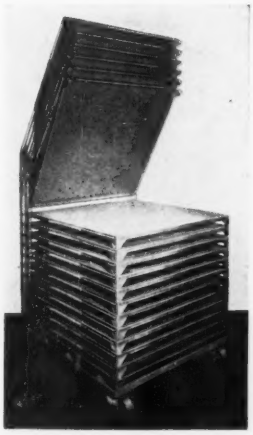
each. These cells, made by the Baldwin-Lima-Hamilton Corporation of Philadelphia 42, Penna., incorporating SR-4 resistance wire strain gages, provide one of three symmetrically placed supports for each churn, as shown in the accompanying schematic sketch, at ceiling level of the room below.

A single, direct-reading, 20,000-lb. indicating controller is incorporated in the system to operate solenoid valves in fill lines. Each load cell is connected through an 8-point switching unit to this instrument. The indicator is calibrated to read directly the weight of the churn's contents. The controller is set for any weight up to 16,000 lb. and automatically shuts off a solenoid valve in the desired fill line when this weight is reached. To guard against over-filling, a high-limit alarm will sound at 17,500 lb. A low-limit alarm is set at 1000 lb. to indicate when the tank is nearly emptied. In addition to high accuracy the system minimizes attention required when filling and emptying the churns.

Stress Plus Heat?

SEE PAGE 550

SPRING LEAF TRUCK



This new Truck gives unobstructed access to three sides of each tray and offers a convenient method for storing materials that require cooling or air drying. The one piece construction Trays are spring supported and can be quickly raised or lowered, free from all locking devices. Trucks having 18 perforated trays 36" x 36" or plain surface trays 36" deep by 4 ft., 6 ft. and 8 ft. long, can be furnished either stationary or mounted on casters.

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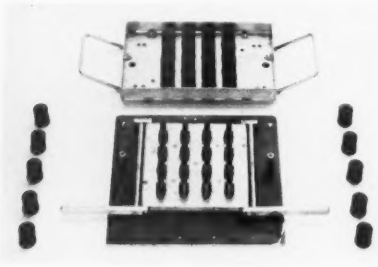
Western RMH Cut-Out Machine and Dies

The Western RMH Cut-Out Machine, a product of the Western Supplies Co., 2920 Cass Ave., St. Louis 6, Missouri, which was originally designed for use in shoe styling operations, is finding increasing application in the rubber manufacturing industry. In addition to its use for cutting gaskets and washers, the unit is adaptable to trimming flash from molded rubber goods. According



to the company, flash can be trimmed close to the molded edge due to the design of the machine which enables the operator to have complete control and full vision during the entire flashing operation.

Featuring versatility, the RMH cut-out machine uses no paper, but cuts on replaceable hardened steel plate. The "hammer action" is controlled by the feet, leaving both hands free. Dies are readily interchangeable, each die generally carrying its own striking plate. An embossing attachment applies controlled heat and sustained pressure. The unit has a cutting area approximately $8\frac{1}{2} \times 9$ inches, and operates from a line shaft or $\frac{1}{2}$ hp motor. It is furnished with or without a pedestal base.

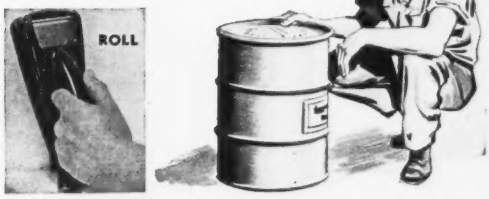
The Western Supplies Co. also furnishes specially designed dies for use with its own or other types of cutting machines. Typical of these special dies is that shown in the accompanying photograph. In this case the die was designed for trimming out the center of a long ribbed molded rubber spark plug cover, and the photograph depicts a loaded view of the die and the pieces for which it was designed. The operation in this case is so arranged that the operator may trim 16 cuts at one time and have the individual pieces in an easy-to-handle tray.

World's Largest Conical Blender

Work was recently completed on a conical dry blender that the Patterson Foundry & Machine Co. of East Liverpool, Ohio, believes to be the largest ever built. The unit is 13 feet in diameter and has a total capacity of 1,000 cubic feet and a working capacity in excess of 700 cubic feet. Especially developed for blending a mixture of technical gelatin and antifoam paste, which has a combined weight of 42 lbs. per cu. ft., the blender holds a batch of approximately 30,000 pounds. The entire contents of a railroad car can be intimately and uniformly blended in a single batch operation in this gigantic dry blender. The Patterson company built this unit for a customer whose process could not be handled in segments and still maintain the necessary uniformity of product.

USE THIS ACCELERATOR AT

158° F



If your mill work is colder, you are going to overwork the stock. If you run it hotter, there is danger of scorching. 158 degrees means 158 degrees, not 150 or 162. Use the Cambridge Roll Pyrometer to check the surface temperature of mill, warming and calender rolls. You can do it while rolls are in motion. This is an accurate, quick, acting, rugged instrument that takes the guesswork out of temperature determination. *Needle, Mold and Combination Models also available.*

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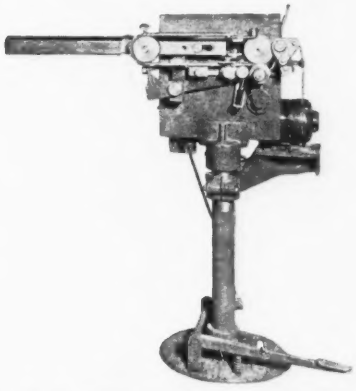

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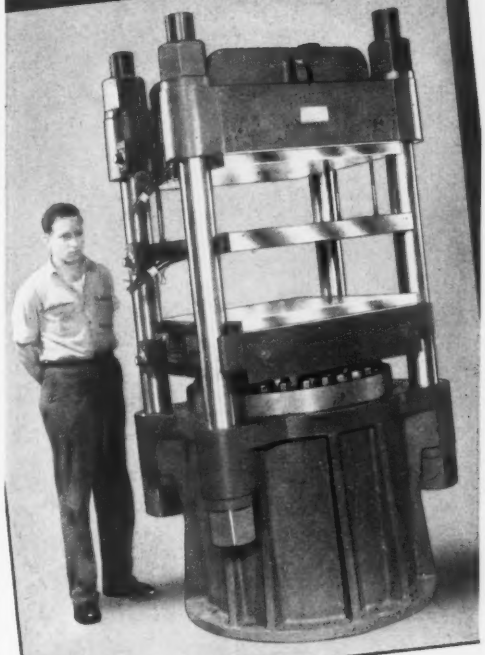

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REVIEWS

BOOKS

Copolymerization. By Turner Alfrey, Jr., John J. Bohrer, and H. Mark. Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 6 x 9 in. 270 pp. $6.80.

Issued as Volume VIII in the series of monographs on the chemistry, physics and technology of high polymeric substances being published under the general title of "High Polymers" by Interscience Publishers, this book brings the technical data on polymerization up to date. Actually, it correlates data and ideas accrued from an intensified investigation of copolymerization conducted at the Polytechnic Institute of Brooklyn in the five-year period from 1945 to 1950 with those of other laboratories, combined with additional theoretical and experimental results which came to light in the 1950-51 period. The authors are quite aware of the comprehensive data on copolymerization published by Mayo and Walling in the April, 1950, issue of *Chemical Reviews*.

The coverage of copolymerization given by the book is well indicated by the titles of its 13 chapters, which are as follows: (1) Introduction; (2) Kinetics of Copolymerization; (3) Monomer Structure and Reactivity with Free Radicals; (4) Detailed Discussion of Monomer Reactivities in Terms of Resonance and Polarity; (5) Effect of Temperature and Environment on Copolymerization Reactivity Ratios; (6) The Polymerization of Tri- and Multicomponent Systems; (7) Detailed Structure of Copolymer Chains; (8) Drift of Copolymer Composition with Increasing Conversion; (9) Copolymerization Involving Divinyl Monomers; (10) Copolymerization Behavior of 1,3-Dienes; (11) Rates and Molecular Weights in Copolymerization; (12) Copolymerization by Ionic Mechanisms; (13) Influence of Copolymerization on Physical Properties of Polymeric Systems.

A bibliography is appended to each chapter. Author and subject indexes are included.

•

Statistical Methods for Chemists. By W. J. Youden. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6 x 9 in. 126 pp. $3.00.

Statistical techniques have become part and parcel of chemical research. This book, the first of its kind written especially for chemists, is designed to help the chemist who has no statistical background but wants to use statistics in his day-to-day research. The author makes no pretense of covering all the statistical techniques in this 126-page book, but he does include the more important ones which are apt to be used in situations which arise most frequently. Written from the laboratory man's point of view, explanations are given in detail. All examples used are based on actual data from real investigations. The book has 10 chapters, an appendix, a subject index, and a list of publications referred to in the text.

•

Standards on Textile Materials. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 612 pp. $3.00.

Prepared by Committee D-13 on Textile Materials, the latest edition of this compilation includes in their most recent form 88 specifications, test methods and tolerances developed by the Committee. Included for the first time is the very comprehensive tentative methods of test for resistance to abrasion of textile fabrics. Considerable other material on textile testing is included. As usual, there is a convenient table of contents (by subject and A.S.T.M. serial designation) and an index of methods of test.

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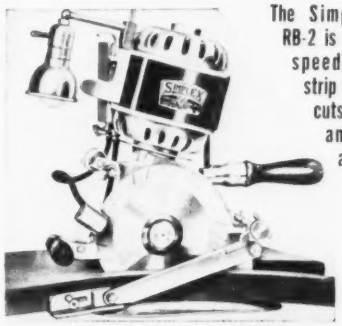

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BOOKLETS, CATALOGS, etc.

Blueprint for Industry. Part VI. Tire Fabric Machinery. Rubber Equipment Division, Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, Ohio. 8½ x 11 in. 28 pp.

This booklet completely describes integrated constant tension systems and component machines for the continuous processing of nylon, rayon and cotton tire cords and fabric. Tire cord impregnators, fabric cementers, calender trains and nylon fabric hot stretching machines are among the major types of equipment treated in detail. Systems described cover a wide range of capacities, from 1,000-tires-per-day latexing machines up to high-speed equipment for operation above 70 yards per minute. A feature of the booklet is a large-size drawing and a detailed description of a cord impregnator in train with rubber calenders for both woven and weftless fabric. Forty photographs and diagrams aid in the graphic exposition of the numerous types of processing systems. A detailed treatment of proven components for latex impregnators—mill roll let-offs, fabric take-ups, tension stands and dipping machines—is also given in the booklet.

•

X-Ray Diffraction and Geiger Counter X-Ray Spectrometric Equipment. Research and Control Instruments Division, North American Philips Co., 750 South Fulton Ave., Mount Vernon, N. Y. 8½ x 11 in. 60 pp.

In addition to X-ray diffraction, spectrometry and fluorescense analysis, this catalog covers such components and accessories as tubes, rectifiers and cameras. It also has sections on camera mounting brackets, film illuminators and measuring devices, as well as monochromators. Also described are wide-range goniometers, fluorescence analysis, universal working arrangements, Geiger tubes, electronic circuit panels, and table model spectrometers. Considerable space is devoted to the Philips Electron Microscope. Information is also provided on applications for X-ray instruments along with typical charts which show how specimens differ when analyzed by this laboratory and production control instrument.

•

Brown Instruments Composite Catalog. (Catalog No. 5000). Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Penna. 8½ x 11 in. 28 pp.

The principal instruments, control devices and related components manufactured by the company are described and illustrated in this catalog. Specifications of approximately 100 measuring and control instruments and valves are outlined. Included are several new designs including the "Differential Controller" and "Tel-O-Set Controller" family.

•

Radiamatic Pyrometers Compensated Radiation Detectors. (Catalog No. 9300). Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Penna. 8½ x 11 in. 28 pp.

The Brown Instruments line of "Radiamatic" pyrometers is completely described in this new catalog. Included are sections on operation, theory, constructional features, engineering specifications, accessories and typical applications. Many photographs and line drawings supplement the written information.

•

Adjustable Port Valves. (Catalog No. 1800). Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Penna. 8½ x 11 in. 12 pp.

This catalog covers the use of Honeywell "Air-O-Motor Diaphragm Operators" with "North American Adjustable Port Valves". Complete specification data is given covering valves for gas, air, oil, steam and water regulation. Also included are mounting dimensions, material specifications, maximum pressures and step-by-step ordering information. The catalog is illustrated with photographs and engineering drawings.

Baker & Adamson Laboratory Reagents and Fine Chemicals. General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 5½ x 8½ in. 264 pp.

General Chemical Division of Allied Chemical & Dye Corp. offers approximately 1,000 products under its Baker & Adamson trade-mark. They range from small bottle lots of laboratory reagents to carload quantities of fine chemicals for exacting industrial uses. These chemicals are listed and described in this handsome book. Also contained is such useful information as proper procedures in storage and handling, methods of packaging, etc.

•

Flexol Plasticizers. (Catalog No. F-5882A). Carbide and Carbon Chemicals Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 76 pp.

This catalog contains descriptive write-ups on twelve Flexol plasticizers and a wealth of graphical and tabular comparisons of their properties, including volatility, extraction resistance, and low-temperature and electrical properties. There are also detailed sections describing the specific utility of the plasticizers in vinyl dispersions, nitrocellulose lacquers, natural and synthetic rubbers, and plasticizer emulsions.

•

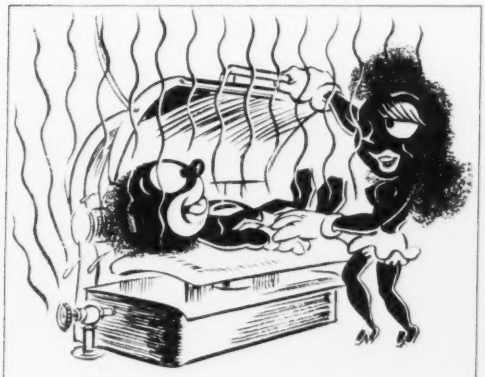
Staflex KA in Plastisol Top Coats. Deecy Products Co., 120 Potter St., Cambridge 42, Mass. 8½ x 11 in. 4 pp.

The use of Staflex KA in plastisol top coats is described in this technical report. The concept of top coating a material by the use of plastisols is elaborated upon. To this end, the plasticizer Staflex KA is discussed with emphasis on those characteristics which make it suitable for use in plastisols. The possibilities of the resultant top coating are pointed up. It is concluded that coatings as high as 40 mils thick appear to be practical. The report contains graphs and tabular material.

•

Electrical Insulating Materials. (Bulletin No. CDL-35). Chemical Division, General Electric Co., Pittsfield, Mass. 8½ x 11 in. 8 pp.

The various types of electric insulating materials produced by the company are described in this bulletin. Properties and applications of G-E varnishes, Glyptal alkyd resin insulating finishes, varnished cloths and tapes, sealing and filling compounds, and G-E silicone insulating materials are described, with accompanying photographs.



Stress Plus Heat?

SEE PAGE 550

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REVIEWS (CONT'D)

Rotary Work Feed Tables. (Bulletin No. T-85). Bellows Co., 222 West Market St., Akron 9, Ohio. 8½ x 11 in. 16 pp.

This bulletin completely describes and illustrates the line of rotary work feed tables produced by the company. It contains installation photographs, and describes in detail all parts of both "Bret 22" (standard 22-inch table top) and "Bret 10" (standard 10-inch table top), including dimensional tables and specification data. The bulletin also shows wiring diagrams and electrical hook-ups to combine the tables with other Bellows "packaged" pneumatic devices.

•

Tri-Homo Homogenizer-Disperser. Tri-Homo Corp., Salem, Mass. 8½ x 11 in. 12 pp.

Features of the Tri-Homo Homogenizer-Disperser are described and illustrated in this bulletin. A large sectional view shows the main parts that produce the effective grinding action of the machine. Also described are standard and special rotors designed to fit specific requirements. Laboratory models, medium production models and large production models are discussed. The bulletin also outlines varied pump assemblies which are recommended where large production requirements are necessary.

•

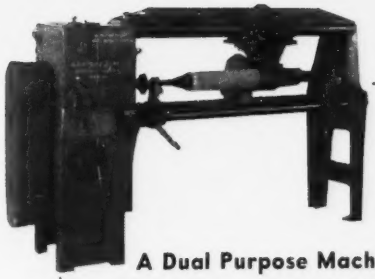
Fenwal Thermoswitch Thermal Controls. (Catalog No. 400). Fenwal, Inc., Ashland, Mass. 8½ x 11 in. 52 pp.

This catalog describes the design, operating characteristics and installation of each of ten variations on the basic Fenwal "Thermoswitch" temperature control unit. A special section concerning the selection and application of the unit discusses such subjects as operating differential, sensitivity, temperature variation, lag and overshoot, characteristics of heat sources, frequency of switching, and installation in solids, liquids and gases. The catalog is illustrated with many drawings, photographs, graphs and tables.

•

Naugatuck Chemical. Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. 8½ x 11 in. 16 pp.

The diversified products manufactured by Naugatuck Chemical are described and illustrated in this booklet. Among the many items discussed are Paracril (the company's nitrile rubber), synthetic latices, aqueous dispersions, compounded latex, vinyl resins, high impact styrene molding and extrusion powders, polyester resins, and a complete line of rubber compounding ingredients and processing agents.



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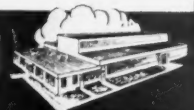

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

Natural Rubber

The President of Indonesia has issued a decree, effective February 4, establishing new foreign exchange rates. The quotations for foreign exchange have been set at three times the former official rate. For example, the new official rate for U. S. dollars is 11.40 per Indonesian rupiah; for the British pound, 31.72; for the Dutch guilder, 3.00; and for the Straits dollar, 3.715.

An increase in export duties was also announced. Under the new system, "strong" products, such as rubber, will be charged an additional levy of 25% ad valorem. This is in addition to the current export duties, which are fixed.

Singapore rubber prices declined over three cents a pound following the announcement of the Indonesian currency devaluation. Another contributing factor, according to dealers, was the liquidation of stocks in view of additional Malayan replanting. One market authority said he thought devaluation of the Indonesian rupiah would not severely affect Singapore markets. He pointed out that the actual advantage to Indonesian exporters was about 8% after taking into consideration the new export tax. Other dealers assumed offerings from Indonesia would be more plentiful.

The transfer of 25,000 tons of British stockpile rubber to the U. S. has met with mixed reaction in world markets. If only the 25,000 tons are involved, the transaction is not particularly significant in the over-all world rubber picture. If about 75,000 tons were involved, as some sources hold probable, then the transfer might act as a buffer to declines in the primary markets.

Quotations for the markets in London and Singapore follow:

London Markets

(Standard Smoked Sheets)

March	45.21 - 45.50
April	44.92 - 45.21

Singapore Market

(Standard Smoked Sheets)

March	43.13 - 43.20

Domestic Natural Rubber Prices

Grade	Price (per lb.)
Ribbed Smoked Sheets, No. 1	50½
No. 2	49¼
No. 3	48
No. 4	47
No. 5	42½
Thin Latex, No. 1X	58½
No. 2	57½
No. 3	54½
No. 4	51½
Thick Latex, No. 1X	58½
No. 2	57½
No. 3	54½
No. 4	51½
Thin Brown, No. 1X	45½
No. 2X	44
No. 3X	38½
No. 1	40½
No. 2	39½
No. 3	38½
No. 4	36½
Blanket (Amber), No. 2	40½
No. 3	39½
No. 4	38½
Smoked Blanket, No. 1	40½
No. 2	38½
Flat Bark	32½
Beni Bolivian, Para	43½
Liquid Latex	62½

Note: These are General Services Administration Prices (plus service charges) for delivery ex G.S.A. shipping points.

NEW YORK, FEB. 5, 1952

Scrap Rubber

Earlier trade predictions that the scrap market would be accelerated with the lifting of restrictions on the production of second-line tires have not been substantiated during the past period. What the future may hold is problematical, but at the moment the scrap rubber market is dull. Prices established by the Office of Price Stabilization for scrap rubber follow:

(Prices Delivered Akron)

Mixed tires	ton	$26.00
Mixed beadless tires	ton	34.00
Light colored carcass	ton	130.00
Black carcass	ton	50.00
No. 1 peelings	ton	65.00
No. 2 peelings	ton	42.00
No. 3 peelings	ton	38.00
Buffings	ton	30.00
Truck and Bus S.A.G.	ton	28.00
Passenger S.A.G.	ton	28.00
Mixed S.A.G.	ton	26.00
Light colored tubes	lb.	.16
Natural rubber red tubes	lb.	.16
Natural rubber black tubes	lb.	.11½
Mixed natural rubber tubes	lb.	.10
Butyl rubber tubes	lb.	.057
GR-S rubber tubes	lb.	.02
Mixed synthetic tubes	lb.	.03

Reclaimed Rubber

Consumption of reclaimed rubber in the first eleven months of 1951 has been estimated at 324,570 long tons by the United States Department of Commerce, as compared with the 273,550 long tons consumed in the first eleven months of the preceding year. As of November 30, 1951, the department listed 44,933 long tons in stocks on hand. At the end of November, 1950, 33,960 long tons were reported on hand. OPS-established prices for reclaimed rubber follow:

(Prices for All Areas Except Calif.)

Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14½
No. 1 Light Colored Carcass	.20¾
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.14½
S.P. Natural Rubber Black Tube	.21
Natural Rubber Black Tube	.20
Natural Rubber Red Tube	.24¼
Natural Rubber Gray Tube	.24¼

Cotton Tire Fabrics

Trade sources do not see any lessening in cotton tire fabric market activities in the next few months even though NPA has increased by 20% the amount of high tenacity rayon which rubber manufacturers may use. Shortages of chemicals, notably sulfur, may yet cause some cut-back in rayon. This, in turn, will help maintain the cotton tire fabric market. Prices have held steady during the past period. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.90
Extra Staple, Peeler, 12/4/2	lb.	.96

Chafers

14.4 oz. (per square yard)	lb.	.86
9.25 oz. (per sq. yard)	lb.	.81½
11.65 oz. (per sq. yard)	lb.	.79
8.9 oz. (per sq. yard)	lb.	.84

Cotton

There is considerable doubt that the Office of Price Stabilization will revise its raw cotton order according to the recommendations of some segments of the industry. The lack of a unified position by the industry and the present lag in buying will probably cause the agency to leave the order as is, trade sources predict.

Exchanges and many shippers have asked OPS to change the futures ceiling and to liberalize pricing on exports but other segments of the industry oppose the move. The requested changes would place even-running lots at spot, compared to the present price of 45.76c a pound, the spot mixed lot ceiling.

Officials of the Department of Agriculture announced on February 1 that an order would soon be issued designating Fresno, Calif., as a bonafide spot cotton market under the Cotton Futures Market Act. Fresno will be the first market in the far western cotton growing area to receive this recognition.

The Munitions Board has lowered its specifications for moisture tolerance of the extra-long staple cotton which it is stockpiling in order to accelerate the program. The Commodity Credit Corporation is purchasing this type of cotton for the Munitions Board through cash deals and barter arrangements in Egypt and elsewhere.

The Department of Agriculture has estimated 1952 world cotton production at about 34,500,000 bales of 500 pounds each. This is the second highest figure on record, 24% larger than the 1950-51 output and about 4,000,000 bales under the 1937 record.

Quotations for middling uplands on the Exchange follow:

	Jan. 9	February 5		
	Close	High	Low	Close
Mar.	42.57	41.90	41.47	41.90
May	42.44	41.46	40.96	41.43
July	42.08	40.67	40.20	40.67

Synthetic Rubber

(Dry Types—Per Pound)

Butaprene NF	.465 - .475
Butaprene NL	.475 - .485
Butaprene NAA	.515 - .525
Butaprene NXM	.550 - .560
Chemigum 30N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
G-E Silicone Rubber (compounded)	3.20 - 4.40
G-E Silicone Gum (not compounded)	—— - 5.00
GR-I	—— - .2075
GR-S	—— - .260
Hycar OR-25	.450 - .460
Hycar OR-15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Types CG and AC	—— - .500
Neoprene Type E	—— - .650
Neoprene Types FR and KNR	—— - .800
Neoprene Type GN	—— - .380
Neoprene Type GN-A	—— - .380
Neoprene Type RT	—— - .400
Neoprene Type S	—— - .380
Neoprene Type W	—— - .400
Paracril B	.500 - .510
Paracril BJ	.500 - .510
Paracril C	.580 - .590
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	—— - .470
Thiokol Type FA	—— - .640
Thiokol PR-1	—— - .950
Thiokol Type ST	—— - 1.000

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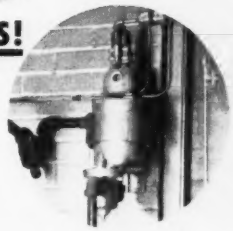

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CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

FEBRUARY 5, 1952

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

[a] East of Mississippi.

*For Export Only

—The arrangement of this section follows closely the Chemical Section of the 1951-52 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.

—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.

ACCELERATORS

A-1 (Thiocarbanilide)	lb.	.48	-	.55
A-32	**lb.**	**.59**	**-**	**.69**
A-77	lb.	.47	-	.60
A-100	lb.	.47	-	.60
Accelerator No. 8	lb.	—	-	.98
Accelerator—49	**lb.**	**.48**	**-**	**.49**
Accelerator—89	**lb.**	**—**	**-**	**1.20**
Accelerator—122	**lb.**	**—**	**-**	**1.30**
Accelerator—552	lb.	—	-	2.00
Accelerator—808	**lb.**	**.59**	**-**	**.61**
Accelerator—833	**lb.**	**1.13**	**-**	**1.15**
Altax	lb.	.42	-	.44
Ancap*	lb.	.34	-	.36
Ancatax*	lb.	.42	-	.44
Ancazate* BU (ET & ME)	**lb.**	**—**	**-**	**1.00**
Ancazide* ET	lb.	—	-	1.00
ME	lb.	—	-	1.10
Arazate	**lb.**	**—**	**-**	**2.16**
Beutene	**lb.**	**.59**	**-**	**.61**
Bismate, Rodform	lb.	—	-	3.00
Butasan	**lb.**	**—**	**-**	**1.00**
Butazate	**lb.**	**—**	**-**	**1.00**
Butyl Eight	lb.	1.00	-	1.35
Captax	lb.	.34	-	.36
C-P-B	**lb.**	**—**	**-**	**1.95**
Cumate, Rodform	**lb.**	**—**	**-**	**1.45**
Dibenzo G-M-F	lb.	—	-	2.50
Diorthotolylguanidine	lb.	.52	-	.53
Diphenylguanidine	lb.	.43	-	.44
El-Sixty	lb.	.45	-	.52
Ethasan	**lb.**	**—**	**-**	**1.00**
Ethazate	**lb.**	**—**	**-**	**1.00**
Ethex	**lb.**	**—**	**-**	**1.00**
Ethyl Thiurad	**lb.**	**—**	**-**	**1.00**
Ethyl Tuex	**lb.**	**—**	**-**	**1.00**
Ethylac	lb.	.88	-	.90
G-M-F	**lb.**	**—**	**-**	**2.50**
Good-rite Erie	lb.	.35	-	.37
Guantal	lb.	.55	-	.62
Harvex	**lb.**	**.52**	**-**	**.57**
Hepteen	lb.	.42	-	.44
Base	lb.	1.80	-	1.85
Ledate, Rodform	lb.	—	-	1.00
Mercaptobenzothiazole	lb.	.34	-	.36
Mercaptobenzothiazyl Disulfide	lb.	.42	-	.44
Mertax	lb.	.50	-	.52
Methasan	**lb.**	**—**	**-**	**1.00**
Methazate	**lb.**	**—**	**-**	**1.00**
Monex	**lb.**	**—**	**-**	**1.10**
Mono Thiurad	**lb.**	**—**	**-**	**1.10**
Morfex	lb.	.59	-	.61
2-MT	lb.	—	-	.75
NA-22 (for neoprene)	lb.	—	-	1.50
O-X-A-F	lb.	.43	-	.45
Pentex	lb.	—	-	1.00
Flour	lb.	—	-	.20
Permalux (for neoprene)	lb.	—	-	1.85
Phenex	lb.	.40	-	.43
Piperate	lb.	—	-	1.53
Pip-Pip	lb.	—	-	2.25
R-2 Crystals	lb.	—	-	2.20
R-tax	lb.	.44	-	.46
RZ-50	lb.	—	-	1.00
SA-52	lb.	—	-	1.10
SA-57	lb.	—	-	1.00
SA-62	lb.	—	-	1.00
SA-66	lb.	—	-	1.45
SA-67	lb.	—	-	1.00
SA-77	lb.	—	-	1.00
Safex	lb.	—	-	1.15
Santocure	lb.	.68	-	.75
Selazate	lb.	—	-	1.45
Selenac (Ethyl, Methyl)	lb.	—	-	1.45
Setsit-5	lb.	.75	-	1.05
SPDX-GH (tons)	lb.	.64	-	.95
G.L.	lb.	—	-	.95
Tellurac	lb.	—	-	1.45
Tepidone	lb.	—	-	.55
Tetrone	lb.	—	-	1.25
A	lb.	—	-	1.85
Thiofide	lb.	.42	-	.49
Thionex	lb.	—	-	1.10
Thiotax	lb.	.34	-	.41
Thiurad	lb.	—	-	1.10
Thiuram E	**lb.**	**—**	**-**	**1.00**
M	**lb.**	**—**	**-**	**1.10**
Trimene	**lb.**	**.54**	**-**	**.56**
Base	lb.	1.03	-	1.06
Tuads, Ethyl	lb.	—	-	3.00
Tuads, Methyl	lb.	—	-	3.10
Tuex	lb.	—	-	1.10
Ultex	lb.	1.00	-	1.05
Unads	**lb.**	**—**	**-**	**1.10**
Ureka Base	lb.	.66	-	.73
Ureka C	**lb.**	**.68**	**-**	**.75**
Vitasan Crystals	**lb.**	**.48**	**-**	**.53**
Vulcanex	lb.	—	-	.53
Z-B-X	**lb.**	**—**	**-**	**2.45**
Zenite	lb.	.42	-	.44
A	lb.	.50	-	.52
B	lb.	.50	-	.52
Zenite Special	lb.	.43	-	.45
Zetax (uncoated)	lb.	.43	-	.45
Zimate, Butyl	lb.	—	-	1.00
Zimate, Ethyl	lb.	—	-	1.00
Zimate, Methyl	**lb.**	**—**	**-**	**1.00**

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.13¼	-	.14¼
Fish Oil, Hydrogenated, Fatty Acid				
Hydrofol Acid (dlvd.)	lb.	.11	-	.15
Hyfac 430 (dlvd.)	lb.	.17	-	.18½
Neo-Fat H.F.O. (dlvd.)	**lb.**	**.14½**	**-**	**.15¾**
Stearex Beads (dlvd.)	**lb.**	**.12**	**-**	**.13¼**
Lime, Hydrated				
Arrowhead	ton	—	-	20.65
Marblehead	ton	—	-	14.30
Sierra	ton	—	-	19.50
Litharge				
Eagle (dlvd.)	lb.	—	-	.2190
FnB (dlvd.)	lb.	—	-	.2255
Magnesium Oxide, Heavy				
General Magnesite 500	lb.	.05	-	.06½
600	lb.	.06	-	.08
Michigan No. 15	lb.	.0550	-	.0600
Permanente	lb.	.05	-	.06½
Magnesium Oxide, Light				
Baker's (Neoprene Grade)	lb.	—	-	.31
General Magnesite (Neoprene Grade)	lb.	—	-	.30
General Magnesite No. 101	lb.	—	-	.19
General Magnesite Standard	lb.	—	-	.22
K & M (Neoprene Grade)	lb.	—	-	.31
Maglite D	lb.	—	-	.25
M	lb.	—	-	.31
Marine's (Neoprene Grade) (l.c.l.)	lb.	—	-	.31
Michigan No. 30	lb.	—	-	.24
No. 40 Extra Light	lb.	—	-	.31
Witco Extra Light	lb.	.32	-	.35

ACTIVATORS (Cont'd)

Oleic Acid				
Emersol 210 (dlvd.)	lb.	.11¾	-	.14¾
L.C.P. Red Oil	lb.	.11¾	-	.14¾
Palm Oil Fatty Acid (c.l.)	**lb.**	**.11½**	**-**	**.14½**
Potassium Oleate (drums)	lb.	.45	-	.55
Red Lead				
Eagle	lb.	—	-	.2282
No. 2 RM (dlvd.)	lb.	—	-	.2282
Sodium Laurate, 75%	lb.	.64	-	.74
Sodium Oleate, 75%	lb.	.45	-	.55
Paste (drums)	lb.	—	-	.20
Sodium Stearate, 75%	lb.	.45	-	.55
USP Grade (drums)	lb.	—	-	.37
Stearic Acid, Single Pressed				
Emersol 110 (dlvd.)	lb.	.12	-	.13¼
Groco 53	lb.	.12	-	.13¼
Stearex B (dlvd.)	**lb.**	**.15½**	**-**	**.16¾**
Stearic Acid, Double Pressed				
Groco 54	lb.	.12¼	-	.13¾
Stearic Acid, Other				
Neo-Fat 1-58	lb.	.1190	-	.1315
1-60	lb.	.1400	-	.1525
1-65	lb.	.1450	-	.1575
White Lead Basic Carbonate	lb.	—	-	.2110
White Lead Basic Sulfate	lb.	.13¼	-	.14¼
Zinc Laurate				
Laurex	lb.	.29	-	.30
Zinc Stearate	lb.	.41	-	.43
Aquazinc	lb.	.26	-	.35

Unclassified Activators

Actifat (dms.)	lb.	—	-	.18
Aktone	lb.	.22	-	.24
Barak	**lb.**	**—**	**-**	**.60**
Curade	lb.	.57	-	.59
D-B-A	**lb.**	**—**	**-**	**1.95**
Delac I	lb.	.53	-	.57
Dibutylamine (dlvd.)	lb.	.54¾	-	.55¾
MODX-B	lb.	.20	-	.25
NA-11	lb.	—	-	.65
Polyac	lb.	—	-	1.60
Ridacto (drums)	lb.	.25	-	.26
Stadrite (dlvd.)	lb.	.15½	-	.16¼
SOAC (min. 10 dms.)	cwt.	—	-	8.00
SOAC-KL (min. 10 dms.)	cwt.	—	-	8.00
Vulklor	lb.	.75	-	.85

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	**lb.**	**.17**	**-**	**.21**
Aqua Ammonia (dms.)	lb.	.031	-	.035
M.B.M. (l.c.l.)	lb.	—	-	.35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	—	-	.12½
Regular	lb.	—	-	.08½
D.C. Antifoam A	lb.	5.65	-	6.65
Defoamer 630	lb.	—	-	.12½
Modicol A	lb.	.12	-	.15
B	lb.	.35	-	.40

ANTI-OXIDANTS

Agerite Alba	lb.	2.20	-	2.30
Gel	lb.	.60	-	.62
Hipar	lb.	.91	-	.93
H. P.	lb.	.67	-	.69
Powder	lb.	.49	-	.51
Resin	lb.	.65	-	.67
Resin D	lb.	.49	-	.51
Stalite	lb.	.49	-	.51
White	lb.	1.40	-	1.50
Akroflex C	lb.	.67	-	.69
F	lb.	.67	-	.69
Aminox	lb.	.49	-	.51
Antioxidant 2246	lb.	1.60	-	1.63
Antox	lb.	.49	-	.51
Aranox	lb.	—	-	3.25
Benzoquinone	lb.	1.50	-	1.75
Betanox Special	lb.	.70	-	.72
B-L-E	lb.	.49	-	.51
Carvacrol	lb.	—	-	.78
Deenax	lb.	.95	-	1.05
Eugenol C.95%	lb.	—	-	1.65
Flectol H	lb.	.49	-	.56
Flexamine	lb.	.67	-	.69
Neozone Standard	lb.	—	-	.82
A	lb.	.51	-	.53
C	lb.	—	-	.67
D	lb.	.49	-	.51

EXCLUSIVE AGENTS

RCMA
RAY-BRAND
Centrifuged Latex

REVERTEX
72-75% Latex Concentrate

- Normal Latex
- GR-S Latex Concentrate
- Natural and Synthetic Latex Compounds
- Plastisols

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ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	——	3.00
Parazone	lb.	——	.75
PDA-10 and 20	lb.	.36	.38
Permalux	lb.	——	1.85
Resorcin, Tech. (dlvd.)	lb.	——	.64
Santoflex AW	lb.	.75	.82
B	lb.	.49	.56
BX	lb.	.60	.67
35	lb.	.67	.74
Santovar A	lb.	1.50	1.57
O	lb.	1.30	1.37
Santowhite Crystals	lb.	1.55	1.62
Santowhite L	lb.	.49	.56
MK	lb.	1.25	1.32
S.C.R. (tons)	lb.	.32	.34
Sequestrene AA	lb.	——	1.00
NA2	lb.	——	.82
NA3	lb.	——	.80
Stabilite	lb.	.49	.51
Alba	lb.	.69	.74
L	lb.	.60	.62
White	lb.	.49	.51
Stabilizer No. 1	lb.	——	1.55
Stabilizer No. 320	lb.	——	.75
Sunolite	lb.	.20	.23
Tannic Acid, Tech.	lb.	.46	.48
Thermoflex	lb.	1.61	1.63
A	lb.	.98	1.00
V-G-B	lb.	.65	.67
Wing-Stay S	lb.	.48	.49

ANTI-SCORCHING AGENTS

Armeen HT	lb.	.34	.42
Benzoic Acid, Tech.	lb.	——	.43
Good-rite Vultrol	lb.	.58	.60
Sodium Acetate 60-62% Crystals	lb.	——	.06

ANTISEPTICS AND GERMICIDES

Arquad S	lb.	.22	.25
Formaldehyde (dms.)	lb.	——	.062
G-4 (bbls.)	lb.	.95	2.95
G-11	lb.	——	3.45
Nuodex 100 S.S. (dlvd.)	lb.	——	1.10
Nuodex 100 W.D. (dlvd.)	lb.	——	1.25
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	.24	.28
Ortho Cresol (26°-27°)	lb.	——	.201
Retarder D	lb.	.42	.50
Soligen Drier—Copper 8% (drums)	lb.	——	.22¾
Zinc 8% (dms.)	lb.	——	.21¾
Vancide	lb.	——	.80

ANTI-WEEBING AGENTS (for Latex)

Webnix 33	lb.	1.50	2.25
34	lb.	1.75	2.25

AROMATICS (DEODORANTS)

Bouquet 149	lb.	——	3.00
Coumarin	lb.	——	2.75
Curodex 19	lb.	——	4.75
188	lb.	——	5.75
198	lb.	——	6.75
Deodorant 65	lb.	——	1.00
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Deodorant Oil GD 3427	lb.	1.70	2.00
4440	lb.	3.00	3.50
5296	lb.	1.30	1.60
General Deodorant 18301	lb.	——	2.40
Latex Perfume 5	lb.	——	3.25
6	lb.	——	7.50
9	lb.	——	.65
Naugaromes (dms.)	lb.	1.50	3.00
Neutrodor 31	lb.	2.00	2.50
Neutroleum Delta	lb.	——	2.60
Gamma	lb.	——	2.60
Parador A	lb.	1.75	2.25
B	lb.	.70	1.00
C	lb.	2.75	3.25
D	lb.	1.50	2.00
E	lb.	.25	.55
F	lb.	.32	.47
GD 5280	lb.	2.00	2.50
GD 5348	lb.	1.90	3.25
I	lb.	1.95	2.25
K	lb.	.45	.60
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Resodor 11	lb.	2.00	2.50
12	lb.	1.45	1.75
Rislo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	1.00	3.80
Rubber Perfume 12	lb.	——	2.85
Russian Leather 7	lb.	——	4.10
Vanillin	lb.	3.00	4.05

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.0725	.1075
Blowing Agent CP-925	lb.	——	.35
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	1.95
Sponge Paste	lb.	——	.20
Unicel	lb.	——	.82
ND	lb.	——	1.40
S	lb.	——	.20
Urea	lb.	.0425	.0475

BONDING AGENTS

Durez 12987	lb.	.48	.53
MDI	lb.	7.00	7.75
50	gal.	2.75	3.25
Pliobond 20	gal.	2.75	4.00
30	gal.	3.45	4.70
Reanite	gal.	6.75	7.25
Rex Compounds	gal.	1.30	2.85
Ty-Ply Q (BN & S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	8.11	8.61
Glacial—99½% (bbls.)	cwt.	14.05	14.55
Calcium Nitrate, Tech., Crystals	lb.	.07	.17
Hydroxyacetic Acid—70% (dms.)	lb.	——	.084
Zinc Nitrate, Tech.	lb.	——	.22½

COLORING AGENTS

Black

Aquablak B (also M, R)	lb.	.07¼	.11¼
Aquablak S	lb.	.11¼	.12
Black Shield 4-35 (dms.)	lb.	——	.0825
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.11¼	.12
Raven Black Pure Iron Oxide	cwt.	11.75	12.00

Blue

Blue GD, Dispersed	lb.	——	4.55
Blue GD Paste	lb.	——	1.80
Blue YD, Dispersed	lb.	——	2.75
Milori Blue 11840 (dlvd.)	lb.	——	.37
Monastral Fast Blue CPL	lb.	——	1.77
FCD, Dispersed	lb.	——	2.50
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	——	1.15
Stan-Tone Blue	lb.	1.40	4.00
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	.90	2.40
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.11¼	.12
Mapico Brown (50 lb. bags)	lb.	.12¼	.13

Green

Filo Green D-700 (and D-705)	lb.	——	.30
Green Chromium Oxide, Pure	cwt.	——	38.00
Green Chromium Oxide, Pure, Hydrated	cwt.	——	100.00
Green FD, Dispersed	lb.	——	1.85
Monastral Fast Green GSD, Dispersed	lb.	——	3.20
GSL	lb.	——	1.97
Permansa Green CP-594	lb.	——	1.35
Pigment Green B	lb.	——	1.35
GL-652D	lb.	.88	.93
Ramapo Green	lb.	——	4.00
Rubber Green X-1292	lb.	——	1.00
Stan-Tone Green	lb.	1.50	3.30
Vansul Green M.B.	lb.	1.05	2.45

Maroon

Stan-Tone Maroon	lb.	3.00	3.05
Vansul Maroon M.B.	lb.	1.05	2.80

Orange

Molybdate Orange	lb.	——	.45
Orange FD, Dispersed	lb.	——	2.75
Rubber Orange X-2065	lb.	——	2.60
Stan-Tone Orange	lb.	1.65	4.00
Vansul Orange M.B.	lb.	2.15	3.15

Red

Antimony Trisulfide	lb.	.72	.78
R. M. P. Sulfur Free	lb.	——	.78
R. M. P. No. 3	lb.	——	.72
Cadmium Red	lb.	.95	1.25
Cadmolith Red (bbls.)	lb.	1.30	1.55
Graphic Red (dlvd.)	lb.	——	.80
Indian Red, American, Pure	cwt.	12.25	12.50
Doxco (English)	cwt.	11.50	11.75
Mapico Reds (50 lb. bags)	lb.	.1225	.1250
Oximony Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	cwt.	12.25	12.50
Red PBD, Dispersed	lb.	——	1.75
2BD, Dispersed	lb.	——	1.80
2BL	lb.	——	1.32
PBL	lb.	——	1.65
Rubanox Red CP-762 (dlvd.)	lb.	——	1.40
Rubber Red CP-339 (dlvd.)	lb.	——	1.05
Rubber Red RT-364	lb.	——	.75
Rubber Red RT-425	lb.	——	.75
Rubber Red X-1148	lb.	——	.80
Rubbered	lb.	.1150	.1175
Solfast Red CP-663 (dlvd.)	lb.	——	1.80
CP-787 (dlvd.)	lb.	——	1.30
Stan-Tone Red	lb.	1.10	3.05
Sun Burnt Red	lb.	.1150	.1175
Vansul Red M.B.	lb.	.90	2.60
Watchung Red	lb.	——	1.95

White—Lithopone

Albalith	lb.	.0790	.0890
Astrolith	lb.	.06½	.07¼
Cryptone BT	lb.	.10	.11
Eagle	lb.	.06¼	.06½
Permalith	lb.	.06¼	.06½
Ponolith	lb.	.0790	.0865
Sunolith	lb.	.06½	.07¼

White—Titanium Pigments

Ti-Cal	lb.	.08	.08¼
Ti-Pure	lb.	.21	.24
Titanox A—all grades (dlvd.)	lb.	.19½	.20½
RA (dlvd.)	lb.	.21½	.22½
RA-10 (dlvd.)	lb.	.21½	.22½
RA-NC (dlvd.)	lb.	.21½	.22½
RC (dlvd.)	lb.	.07¾	.08¼
RC-HT (dlvd.)	lb.	.07½	.08
Unitane O-220	lb.	.195	.205
OR-250	lb.	.215	.225
Zopaque	lb.	.19½	.20½

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 33, 44, 55)	lb.	.1760	.1860
Eagle	lb.	.1760	.1860
Horse Head Special	lb.	.1760	.1860
XX Red	lb.	.1910	.2010
XX-505	lb.	.1760	.1860
Protox 166	lb.	.1760	.1860
167	lb.	.1760	.1860
St. Joe Black Label	lb.	.1760	.1860
Green Label	lb.	.1760	.1860
Red Label	lb.	.1760	.1860

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1985	.2085
Eagle Green Seal	lb.	.1935	.2035
Eagle Red Seal	lb.	.1885	.1985
Eagle White Seal	lb.	.1985	.2085
Florence Green Seal	lb.	.1935	.2035
Red Seal	lb.	.1885	.1985
White Seal	lb.	.1985	.2085
Kadox 25	lb.	.1985	.2085
Kadox 15, 17 and 72	lb.	.1760	.1860
U. S. P. 12	lb.	.2085	.2185

White—Zinc Sulfide

Cryptone ZS-800	lb.	.24	.25

Yellow

Cadmolith Yellow (bbls.)	lb.	——	.93
Chrome Yellow	lb.	——	.32
Chrome Yellow 12310	lb.	——	.28
Iron Oxide, Pure	lb.	.10	.10¼
Mapico Yellow (50 lb. bags)	lb.	.1000	.1025
Rubber Yellow X-1940	lb.	——	1.60
Stan-Tone Yellow	lb.	1.00	2.25
Toluidine Yellow	lb.	——	1.91
YL-556-D	lb.	——	.82
Oximony Iron Oxide	lb.	——	.06¾
Vansul Yellow M.B.	lb.	.95	1.55
Yellow GD, Dispersed	lb.	——	2.15
GL	lb.	——	1.62
Zinc Yellow	lb.	——	.27

DISPERSING AGENTS

Anchoid*	lb.	.24	.25
Armeen 18	lb.	.42	.50
Darvan No. 1 (and No. 2)	lb.	.27	.30
Daxad 11 (21, 23)	lb.	.08	.35
Dispersaid	lb.	1.25	1.35
Furala	lb.	.06½	.07½
Halloid	lb.	.04½	.05½
Marasperse C	lb.	.06	.06½
CB	lb.	.11½	.13½
N	lb.	.09	.10
Modicol C	lb.	.08	.12
Rubbex	lb.	.267	.285
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	——	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Trenamine D-25	lb.	.32½	.36
Triethanolamine (drums) (dlvd.)	lb.	.21½	.22½
Yelkin TT	lb.	.14	.18
Zinsper	lb.	——	.15

EXTENDERS

Advagum 1098	lb.	——	.64
Bunaweld Polymer No. 780	lb.	——	.22
No. 5514	lb.	——	.35
D-92 (and D-93) (dms.)	lb.	——	.12
Extender 600	lb.	——	.1480
PR-162 Latex Extender	gal.	——	1.55
Synprolac	lb.	.16	.23
Synprowax	lb.	——	.23
Vistanex	lb.	——	.32

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Practically any type of porcelain forms for rubber or plastic gloves can be supplied by Colonial. These include forms for linemen's or electricians', surgeons', household and industrial gloves. They can also be supplied with the new non-slip design as pictured on the middle form. Some forms are made from Colonial's stock molds, others to customers' specifications.

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FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.19½	1.30
Lignite	lb.	.14	1.20
Pumice	lb.	.03	.05
Aluminum Hydrate	lb.	.07	.10
Aluminum Silicate			
Marter White	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	72.50	90.00
Barytes			
No. 1 Floated, White	ton	37.85	53.60
No. 2 Floated, Un-bleached	ton	35.85	51.60
No. 22 Barytes (c.l.)	ton	——	20.00
Foam A	ton	——	34.85
Bentomite (c.l.)	ton	——	11.50
SPV Voidlay (c.l.)	ton	——	11.50
Blanc Fixe	ton	72.50	120.00
Calcium Carbonate			
Atomite (c.l.)	ton	——	30.00
B.I. White No. 1 (c.l.)	ton	——	7.50
B.I. White No. 2 (c.l.)	ton	——	7.00
Blue Star XX	ton	——	15.50
Calcene T	ton	60.00	70.00
Caltec	ton	40.00	57.50
Calwhite	ton	——	17.00
Camelwite	ton	——	30.00
Gamaco	ton	——	30.00
Kalite (c.l.)	ton	——	50.00
Laminar	ton	——	30.00
Lesamite (c.l.)	ton	——	27.50
Millical (c.l.)	ton	——	32.50
Multiflex	ton	——	120.00
M	ton	——	110.00
Non-Fer-Al	ton	——	25.00
Purecal M	ton	45.00	60.00
U	ton	120.00	135.00
Sierracal	ton	15.00	18.50
Super Multiflex	ton	——	160.00
Surfex (c.l.)	ton	——	35.00
Suspenso (c.l.)	ton	——	30.00
Witcarb R (c.l.)	ton	110.00	120.00
R-12 (c.l.)	ton	71.00	76.00
York White	ton	——	9.50
Calcium Silicate			
Silene EF	ton	120.00	130.00
L	ton	125.00	135.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	——	18.00
Calcium Sulfate, Hydrous			
Terra Alba No. 1	ton	12.00	14.40
Chalk Whiting (l.c.l.)	lb.	.0150	.0175
Recco Paris Whiting	ton	——	33.00
Clay			
Aisilite (c.l.)	ton	14.00	22.50
Absite (c.l.)	ton	——	14.00
Aluminum Flake	ton	22.50	60.00
A.S.P. No. 1 (c.l.)	ton	——	35.00
No. 11 (c.l.)	ton	——	40.00
Buca (c.l.)	ton	——	45.00
Burgess No. 20	ton	——	35.00
No. 30	ton	——	37.00
Burgess Iceberg	ton	——	50.00
Burgess Polyclay	ton	——	45.00
Catalpo (c.l.)	ton	——	35.00
Champion	ton	——	14.00
C.S.D. (c.l.)	ton	——	13.50
Crown	ton	——	14.00
Dixie (c.l.)	ton	——	14.00
Hi-White R	ton	——	13.50
Hydratex R	ton	——	30.00
Kaolinol Clay No. 1	ton	——	30.00
Markham (c.l.)	ton	14.00	35.00
McNamee (c.l.)	ton	——	13.50
Oldham (c.l.)	ton	13.50	35.00
Paragon	ton	——	13.50
Pigment 5	ton	21.85	36.00
Pigment 22	ton	16.50	22.50
Pigment 33	ton	——	37.00
Recco (c.l.)	ton	——	14.00
RX 43	ton	——	33.00
Stan-Clay	ton	25.00	30.00
Stellar-R	ton	——	50.00
Suprex	ton	——	14.00
Upton	ton	19.50	21.50
Whitetex (c.l.)	ton	——	50.00
Diatomaceous Earth	ton	30.00	50.00
Kaylorite (c.l.)	ton	——	30.00
Lorite	ton	——	30.00
Flock			
Cotton, white and colored	lb.	.10	.22
Filfloc F 40-9000	lb.	——	.16
Filfloc F 6000	lb.	——	.40
Pulpol	ton	110.00	210.00
Rayon, bleached or dyed	lb.	.81	1.50
Rayon, grey	lb.	——	.18
Rayon, pink	lb.	——	.14
Solka-Floc (l.c.l.)	lb.	.07	.16
Wool, bleached or dyed	lb.	.70	1.00
Glue, Bone (dlvd.)	lb.	.18	.20½
Leather, Shredded	lb.	.05	.17
Lignin	lb.	.03	.06
Indulin	lb.	.09	.10
Limestone, Pulverized	ton	3.25	10.00
Industrial Filler No. 100	ton	——	5.75
Micro Velva	ton	45.00	48.00
Velvet Filler, Regular	ton	——	25.00
Superfine	ton	——	27.00
Magnesium Carbonate	lb.	.0950	.1050
K & M Clearcarb	lb.	.1225	.1275
Magnesium Oxide	lb.	.05	.06
Magnesium Silicate	ton	18.00	35.00
Airex	ton	25.00	27.00
Asbestel	ton	20.00	22.00
Blue Star Talc	ton	——	23.00
L.S. Silver	ton	23.50	25.50
Sierra White	ton	21.25	23.25

FILLERS (Cont'd)

Mica	lb.	.01¼	.07¼
Concord	lb.	.07	.07¼
Micro-Mica	lb.	.06¾	.07½
Mineralite (c.l.)	ton	25.00	40.00
Silversheen	lb.	.07	.07¼
Triple A Mica (c.l.)	ton	——	25.00
Vermiculite	lb.	——	.11
Wet Ground Biotite Mica	lb.	.05½	.06¼
Wet Ground Mica No. 160	lb.	.07	.07¾
Pyrophyllite			
Pyrax A (c.l.)	ton	——	13.50
WA (c.l.)	ton	——	16.00
Silica	ton	16.00	27.00
Blue Star	ton	——	20.60
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Talc, Domestic	ton	10.00	27.00
Nytal 200	ton	——	25.00
300	ton	——	36.00
Walnut Shell Flour	ton	45.00	111.00
Whiting, Commercial	ton	——	7.00
Cameline (c.l.)	ton	8.50	10.00
C-C-O White	ton	——	17.00
Keystone (c.l.)	ton	——	16.00
Rambo No. 1 White	ton	——	8.50
No. 6 White	ton	——	9.00
Snowflake (c.l.)	ton	——	18.00
Veroc (c.l.)	ton	——	8.50
Welco (c.l.)	ton	——	7.50
York White R (c.l.)	ton	——	8.50
Wood Flour	ton	22.00	49.00

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	2.10	2.35
Black Out	gal.	4.50	8.00
Shellac, Orange Gum	lb.	.45	.54
VarWax	gal.	1.45	1.50

FLAME RETARDANTS

Celluflux	lb.	.36½	.38½
Chlorinated Paraffin 42	lb.	——	.12¼
Chlorowax 70	lb.	.18	.19
Halowax	lb.	.24	.39
Zinc Borate 3167	lb.	.1920	.2020
Zyrox	lb.	.50	.79

LUBRICANTS, MOLD

Aquadag	lb.	3.50	4.00
Aquarex D	lb.	——	.80
L Paste	lb.	——	.94
ME	lb.	——	.97
MDL Paste	lb.	——	.33
WA Paste	lb.	——	.28
Akro Gel	lb.	——	.165
Borax, Granular (l.c.l.)	ton	81.00	86.00
Carbowax 4000	lb.	.31	.35
Colite Concentrate (dms.)	gal.	——	.90
Concentrex	lb.	——	.25
D.C. 7 Compound	lb.	6.20	6.80
D.C. Emulsion No. 35	lb.	1.59	3.50
35A	lb.	1.59	3.50
35B	lb.	1.59	3.50
D.C. Mold Release Fluid	lb.	3.70	6.00
Dipex	lb.	.14	.18
Dri-Lube	lb.	——	.22
Glydag	lb.	1.30	2.00
Hawkeye Flake (dlvd.)	lb.	——	.12
Kokobace	lb.	——	.12
Latex-Lube GR (dlvd.)	lb.	.18½	.19¼
R-66 (dlvd.)	lb.	——	.15
Liqui-Lube (dlvd.)	lb.	——	.14¾
NF (dlvd.)	lb.	——	.15¼
NT (dlvd.)	lb.	——	.15¼
Lubrex	lb.	.25	.30
Lubri-Flo	gal.	10.00	12.00
Migralube	lb.	——	.35
Mold Lubricant No. 72			
Conc.	gal.	2.50	4.00
No. 735	gal.	1.26	2.75
Moldeze No. 3	gal.	5.00	6.00
Mold-Brite	gal.	——	1.50
Mold-Slick	lb.	.253	.271
Mold-White	gal.	——	2.00
Nopcolube	lb.	——	.15
Orvus WA Paste (dms.)	lb.	——	.25
Prodag	lb.	.28	.42
Purity Flake (dlvd.)	lb.	——	.14
Rubber-Flo	gal.	1.15	1.50
Rubber-Glo	gal.	——	.94
Rusco Mold Paste	lb.	——	.25
Sericite (l.c.l.)	ton	65.00	75.00
Thermalube	lb.	——	.13¾
Ulco Mold Soap	lb.	.12	.23
Ucon Lubricants	lb.	.27½	.35½

LUBRICANTS, RUBBER

Extrud-o-Lube	gal.	——	1.84
G B. Naphthenic Neutrals	gal.	.11	.18
Propylene Stearate (dms.)	lb.	.68	.78

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.37	.39
Calcium Stearate	lb.	.35	.37
Glycerized Lubricant	gal.	——	1.48
Polyethylene Glycol	lb.	——	.23
Rexanol	lb.	——	.13
Separex	lb.	——	.25
Slab Dip	lb.	——	.15
Wet-Zinc	lb.	——	.23¼
Zinc Stearate	lb.	.46	.48

MOLD CLEANERS

Actusol (dlvd.)	gal.	1.40	1.60
Metso 99	cwt.	4.00	5.85
Granular	cwt.	3.50	5.15
Rubber-Sol	gal.	2.75	3.25
Shelblast	ton	80.00	140.00
Sprex A.C. (dlvd.)	lb.	.15¾	.15½

PEPTIZING AGENTS

Peptizer P-12	lb.	.84	1.00
RPA 2	lb.	——	.75
3	lb.	——	.46
3-RO	lb.	——	.49
5	lb.	——	.57

PLASTICIZERS & SOFTENERS

AA (drums)	lb.	.35¼	.36¼
Acto 500	lb.	——	.09
Adipol BCA (dms.)	lb.	.43½	.44
2EH	lb.	.42	.43
10A	lb.	.42	.43
American Pitte Tar	lb.	.0410	.0655
Arneel	lb.	.22	.27
Arolene 1980 (c.l.)	lb.	——	.10
Aromatic Tar	gal.	.0573	.1973
Bardol	lb.	.02½	.03¾
B	lb.	.05¾	.06
Bayol D	gal.	——	.382
F	gal.	——	.52
Beeswax, Refined & Bleached	lb.	.60	.65
Yellow Refined	lb.	.52	.55
Bondogen	lb.	.55	.60
B.R.C. No. 20	lb.	.0150	.0160
B.R.H. 2	lb.	.0280	.0290
BRS 700	lb.	.0175	.0260
B.R.T. 3	lb.	.024	.025
4	lb.	.0225	.0235
7	lb.	.0265	.0275
B.R.V.	lb.	.0350	.0515
Bunarex Resins	lb.	.06½	.07¼
Bunatak AH	lb.	.08	.09
U	lb.	——	.15
No. 90	lb.	——	.08
No. 210	lb.	——	.12
Burgundy Pitch	lb.	.0843	.0888
Butac	lb.	.10½	.11½
Butoxyethyl Diglycol Carbonate	lb.	.40	.41
Butyl Benzyl Sebacate	lb.	.61	.63¼
Butyl Carbitol Perlargonate (dms.)	lb.	——	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	——	.68
Butyl Palmitate	lb.	——	.26½
Butyl Roleate	lb.	.176	.18
Butyl Stearate-CP (dms.)	lb.	.31	.33¼
BWH-1	lb.	——	.14
Cabflex Di-BA (dms.)	lb.	.42	.44¼
Di-OA (dms.)	lb.	.43½	.46¼
Di-OP (dms.)	lb.	.40	.42¼
Califlux 510, 550	lb.	.025	.0325
G.P.	lb.	.0125	.02
R-100	lb.	.04½	.05¼
TT	lb.	.02	.02¾
Candellila Wax Prime	lb.	.67	.75
Capryl Benzyl Sebacate	lb.	.67½	.70¼
Carbonex	lb.	.0325	.0375
S Flakes	lb.	.04	.0475
S Plastic	lb.	.0410	.0460
644	lb.	.0375	.0425
Carbowax 4000 (drums)	lb.	——	.29
Cardolite 615	lb.	.33¾	.36¼
816	lb.	.25¾	.28¾
Carnauba Wax, Crude	lb.	.80	1.04
Refined	lb.	.87	.94
Substitute	lb.	.45	1.08
Yellow	lb.	1.15	1.20
Celluflex (dms.)	lb.	.34	.35
Ceresine Wax	lb.	.14	.26
Chlorowax 40	lb.	.16	.17
Contogum	lb.	.06¼	.10¾
CTLA Polymer	gal.	.17½	.32½
Cumar Resins	lb.	.05½	.14½
D.C. 200 Fluid	lb.	4.14	6.00
D.B.M.	lb.	——	.30
Degras, Common	lb.	——	.12
Dibenzyl Sebacate	lb.	.74	.76¼
Dibutoxethyl Sebacate	lb.	——	.56¾
Dibutyl Phthalate	lb.	.29¾	.32
Dibutyl Sebacate—Tech.	lb.	.59	.61¾
C.P.	lb.	.61	.63¾
Dicapryl Adipate	lb.	.40½	.43¼
Dicapryl Phthalate	lb.	.37	.39¾
Dicapryl Sebacate	lb.	.61½	.64¼
Di-Carbitol Phthalate (dms.)	lb.	.41½	.42
Dicyclohexyl Phthalate	lb.	——	.42
Diethyl Phthalate (t.c.)	lb.	——	.24
Di-2-ethlyhexyl Phthalate (t.c.)		——	.37
Dihexyl Adipate	lb.	.33	.35¾
Dihexyl Phthalate	lb.	.28½	.31¾
Dihexyl Sebacate	lb.	.50	.52¾
Di Isobutyl Azelate (dms.)	lb.	.54	.57
Di-iso-octyl Adipate (dms.)	lb.	.40½	.43¼
Di-iso-octyl Phthalate (t.c.)	lb.	.37	.39¾
Dimethyl Phthalate (t.c.)	lb.	——	.23
Dimethyl Sebacate	lb.	.77	.79¾
Dioctyl Phthalate (dms.)	lb.	.37	.39¾
Dioctyl Sebacate (dms.)	lb.	.62½	.65¼
D.I.O.P. (dms.)	lb.	.36	.38½
Dipolymer Oil	gal.	——	.33

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PLASTICIZERS & SOFTENERS (Cont'd)

Dispersing Oil No. 10	lb.	.05¼	.05¾
Dutrex B	lb.	.02¾	.03¼
5 and 6	lb.	.020	.031
15E	gal.	.10	.20
20, 21, 22 and 25	lb.	—	.04
ELA	lb.	—	.80
Elastex 10-P	lb.	.40	.42½
50-B	lb.	.34½	.37
DCHP	lb.	.42½	.43½
Estac	lb.	—	.16
Ethox (dms.)	lb.	.41½	.42
Flexol B-400	lb.	.27	.29
DHP	lb.	.35	.37½
DOP	lb.	.37	.39½
TOF	lb.	.41½	.44
3GH	lb.	.42	.44
3GO	lb.	.51½	.53½
4GO	lb.	.36	.38½
8HP	lb.	.38	.40¼
Galex W-100	lb.	.13½	.15
G. B. Light Process Oil	lb.	.025	.0325
G. B. Naphthenic Neutrals	gal.	.11	.18
Good-Rite GP233	gal.	.47	.49½
GP261	gal.	.42	.44½
Harflex 500 (dms.)	lb.	.36½	.39¼
Hercolyn (dlvd.)	lb.	.16	.16½
Herron-H.T.	gal.	.16	.27
Herron-Plas	lb.	—	.03¾
Herron-Wax	lb.	.05¼	.06
No. 23	lb.	.08¼	.08¾
No. 24	lb.	.07¼	.07¾
HSC No. 13	lb.	.27	.30
Hylene B	lb.	.45	.50
C	lb.	.41	.46
D	lb.	.47½	.52½
Indonex 632½ (633½, 634½, 638½)	gal.	.1100	.1700
Kapsol	lb.	.35½	.36
Kenflex	lb.	.19	.27
KP 23 (dms.)	lb.	.31½	.32½
70 (dms.)	lb.	.34	.34½
120 (dms.)	lb.	.37½	.38
140 (dms.)	lb.	.45½	.46
150 (dms.)	lb.	.29	.30
201	gal.	.41½	.42
Kremol 40	gal.	.36	.46
50	gal.	.36	.46
Kronisol (drums)	lb.	.35	.35½
Kronitex (drums)	lb.	.31½	.32½
Lanolin, Tech. Anydrous	lb.	.21	.23
Lead Oleate	lb.	—	.30½
Lindol (dms.)	lb.	.34	.35
2-Mercaptoethanol (drums)	lb.	—	.75
Methox (dms.)	lb.	.36½	.37
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.30
Modicol G	lb.	—	.23
R	lb.	—	.17
Montan Wax, Crude	lb.	.15	.18
Monten Wax	lb.	.12	.13
Monty Wax	lb.	—	.30½
Morflex No. 100	lb.	.37	.38¼
Natac	lb.	.10	.11
Neolene 210 (t.c.)	lb.	—	.16
212 (t.c.)	lb.	—	.14
220 (t.c.)	lb.	—	.15
Nerium	lb.	—	.09
Nevillac Resins (dms.)	lb.	.23	.45
Neville Resins (dms.)	lb.	.10½	.13½
Nevindene Resins (dms.)	lb.	.12½	.15½
Nevinol (dms.)	lb.	—	.17
Nevoil	lb.	.02¼	.03¼
Nevtex 10 (dms.)	lb.	.08¾	.10½
Nuba 1 (and 2) (dms.)	lb.	—	.04
3X (dms.)	lb.	.05¾	.06¼
15 (and 30) Oil (dms.)	lb.	.36¼	.38
No. 480 Oil Proof Resin	lb.	—	.18
Obopex Q10 (dms.)	lb.	.36½	.37½
Opalwax	lb.	.37	.38
Ortho-Nitrobiphenyl	lb.	.06	.11
Ozokerite Wax No. 64 White	lb.	.31	.32
Yellow	lb.	.25	.26
P-1 (and 4)	lb.	.40	.41¾
P-4C	lb.	—	.37½
P-8	lb.	—	.26¾
Pale 4 (and 10001)	lb.	.35¾	.37¼
Palm Oil	lb.	—	.11
Paradene Resins (dms.)	lb.	.05	.06
Para Flux (dms.)	gal.	.1825	.1925
2016 (dms.)	gal.	.22	.23
Para Lube (t.c.)	lb.	.046	.048
Parmoo	lb.	.06	.13½
Pegton 22	lb.	.72	.75
PG-16 (drums)	lb.	—	.22½
Piccolastic 10 (and 25)	lb.	—	.13
75 (and 100)	lb.	—	.13
Rubber Resin 100	lb.	.1855	.1905
S.O.S.	gal.	—	.29
Piccowizer 30	gal.	—	.05½
Piccolastic A (and B, C, D, E)	lb.	.28½	.29
FT, FHF and FX	lb.	—	.1815
T-135	lb.	.23¼	.23¼
Piccolyte S Resins	lb.	.18½	.20
Piccolyte WW Resins	lb.	.45	.47
Piccoumaron Resins	lb.	.06¾	.17
Piccovar	lb.	.14½	.15
Piccovol	lb.	—	.02½
Pietar	gal.	—	.25
Pigmentar	lb.	.0410	.0655

PLASTICIZERS & SOFTENERS (Cont'd)

Pigmentarol	lb.	.0410	.0655
Plastac M	lb.	—	.09¼
Plasticizer 2286	lb.	—	.26¼
Plasticizer SC	lb.	.49	.52
Plasticizer VA-1	lb.	—	.40
Plasticizer W-13	lb.	.37	.38¼
Plasticizer XP-3	lb.	—	.50
Plastoflex 50	lb.	.26½	.29
52	lb.	.31	.32½
VS	lb.	.40	.42½
Plastogen	lb.	.07¼	.08
Plastolein 9050 (c.l.)	lb.	—	.48
9055	lb.	—	.39
9058	lb.	—	.47
9250	lb.	—	.31
9715	lb.	—	.38
Plastone	lb.	.27	.30
Polycin 781	lb.	.40	.41
Polymel C-128	lb.	.19½	.20½
D	lb.	.22	.24
H-2	lb.	.22	.24
6	lb.	.06¾	.10
7	gal.	.23	.28
Process Oil C-255 (c.l.)	gal.	—	.22
Propylene Stearate (dms.)	lb.	—	.32
PT 400 Pine tar (600, 800) (t.c., dms.)	lb.	.0410	.0534
PX-104	lb.	.34	.42
PX-108	lb.	.38	.46
PX-208	lb.	.41½	.49
PX-404	lb.	.60	.68
Reogen	lb.	.13½	.13½
465 Resin (drums)	lb.	.05	.05½
Resin 731-C	cwt.	—	13.50
Resin C	lb.	.0200	.0285
Resinex	lb.	.03¼	.03¾
L-4	lb.	.02¾	.03
Rexflex	lb.	—	.15
Rosin Oil	gal.	.54	1.20
R.P.A. No. 2	lb.	—	.65
No. 3	lb.	—	.46
No. 5	lb.	—	.57
R.S.O. Softening Oil	lb.	.03	.05
Rubberol	lb.	—	.25¼
Rubtar	gal.	—	.40
Santicizer B-16	lb.	.50	.52
E-15	lb.	.47	.49
M-17	lb.	.44	.46
No. 107	lb.	.40	.42½
No. 140	lb.	.29	.31
No. 141	lb.	.40	.42½
No. 160	lb.	.34	.36
Sherolatum	lb.	.02¾	.05½
Softener No. 20	gal.	.09	.25
Staflex IXA	lb.	.34	.36
Stanolind Petrolatum	lb.	.037	.081
Wax	lb.	.25	.30
Staybelite Resin (dms.)	cwt.	—	9.00
Sunny South Burgundy Pitch	lb.	.1009	.1054
Sunny South Pine Tar	lb.	.0410	.0655
Sunny South Rosin Oil	gal.	.58	.86½
Superla Wax	lb.	.25	.30
Syncera Wax	lb.	.175	.225
Syn Tac (c.l.)	gal.	—	.33
Synthetic Revertant Oil	lb.	—	.16
Tar, Refined	gal.	.12	.17
K-Tarnel NR (t.c.)	lb.	—	.0851
Ternene A	gal.	—	.65
TP-90B	lb.	—	.67
TP-95	lb.	—	.65
TP-98	lb.	—	.65
Triacetin	lb.	.34	.45
Tricresyl Phosphate	lb.	.30	.32½
Turgum S	lb.	.08¾	.09¾
Vanadiset A	gal.	.13	.20
Vistac No. 1	gal.	1.00	1.16
No. 2 (c.l.)	gal.	1.22	1.26
No. 4 (c.l.)	gal.	1.32	1.36
P	lb.	—	.17
Vopcolene 50	lb.	—	.37
Witresin—Granular	ton	41.00	43.00
Solid	ton	36.00	38.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	—	.21
Refined (drums)	lb.	—	.19¼
Castorwax (min. 250 lbs.)	lb.	—	.27¾
Dutrex 7	lb.	.12	.20
Millrex	lb.	—	.15
Resin No. 510	lb.	.13½	.16½
Zyrox	lb.	.50	.79

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾	.21
Alpha Protein	lb.	.24	.28
Ammonium Alginate	lb.	—	.95
Aromocrat	lb.	—	.07½
Carob Bean Flour	lb.	—	.46
Casein	lb.	.28	.38
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.20	.50
Prosein	lb.	.0600	.0630
Rex Compound No. 2801	lb.	—	.15
Stablex B	lb.	.50	.95
K	lb.	.27	.35

RECLAIMING AGENTS

Atmeen C	lb.	.50	.58
T	lb.	.42	.50
No. 517 H.B. Oil	gal.	.11½	.16½
535	gal.	.22	.27
C-6 Oil (and 28, 32)	gal.	.33	.38
C-10 Oil	gal.	.25	.30
C-33 Oil	gal.	—	.21½
Caustic Soda—Flake 76% (c.l., drums)	cwt.	—	3.60
Liquid 50% (t.c.)	cwt.	—	2.40
Solid 76% (c.l., dms.)	cwt.	—	3.20
Cresylic Acid (99-100%)	gal.	1.20	1.39
D-4	gal.	—	.27
E-3	gal.	—	.25
G. B. Reclaiming Oil	gal.	.12	.18
Heavy Aromatic Naphtha	gal.	—	.12¼
LX-27 Reclaiming Solvent	gal.	.21	.30
LX-572 Reclaiming Oil	gal.	.23	.28
Neo-Fat D-242	lb.	.05½	.07¼
PRR 1	gal.	.15	.35
PT 67 Light pine oil	gal.	.50	.60
PT 101 Pine tar oil	lb.	.0410	.0534
Q Oil	gal.	—	.286
Reclaiming Oil 1621	lb.	.03	.04
Reclaiming Oil 3186 (t.c.)	gal.	.28	.38½
Reclaiming Oil 3186-G	gal.	.25	.36½
Reclaiming Reagent No. 4	lb.	.12	.15
R.P.A. No. 3	lb.	—	.46
Soda Ash (c.l., bags)	cwt.	—	1.40
Solvenol 1 (dms.)		—	.36
Solvent 534	gal.	.20½	.26½
Solvent Oil 21	gal.	.24	.29
C-42	gal.	.23	.28
Union Solvent 4060-O	gal.	—	.147
X-1 Resinous Oil	lb.	.0190	.0285
X-60 Solvent	gal.	.24	.32

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0740	.1225
Continental F	lb.	.0740	.1225
Croflex	lb.	.0740	.1225
Dixiedensed (and S)	lb.	.0740	.1225
Kosmobile (and S)	lb.	.0740	.1225
Micronex HPC	lb.	.0740	.1225
Spheron 4	lb.	.0740	.1225
Witco Disperso No. 6	lb.	.0740	.1225

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0740	.1225
Continental A	lb.	.0740	.1225
Croflex TH	lb.	.0740	.1225
Dixiedensed HM (and S-66)	lb.	.0740	.1225
Huber Arrow TX	lb.	.0740	.1225
Kosmobile HM (and S-66)	lb.	.0740	.1225
Micronex Standard	lb.	.0740	.1225
Spheron 6	lb.	.0740	.1225
Texas M	lb.	.0740	.1225
Witco Disperso No. 1	lb.	.0740	.1225

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0740	.1225
Continental AA	lb.	.0740	.1225
Croflex 77	lb.	.0740	.1225
Dixiedensed 77	lb.	.0740	.1225
Kosmobile 77	lb.	.0740	.1225
Micronex W-6	lb.	.0740	.1225
Spheron 9	lb.	.0740	.1225
Texas E	lb.	.0740	.1225
Witco Disperso No. 12	lb.	.0740	.1225
Wyex	lb.	.0740	.1225

Channel, Conductive (CC) (bags)

Continental R-40	lb.	.1800	.2400
Dixie S Dustless	lb.	.0950	.1550
Dixie Voltex	lb.	.1950	.2500
Kosmink Dustless	lb.	.0950	.1550
Kosmos Voltex	lb.	.1950	.2500
Spheron C	lb.	.1400	.1850
Spheron N	lb.	.2500	.3000
Voltex	lb.	.1950	.2500

Conductive Furnace Black (CFB) (bags)

Shawinigan Acetylene Black	lb.	.1600	.2200

Furnace, Fast Extruding (FEF) (bags)

Arovel	lb.	.0600	.1000
Croflex 50	lb.	.0600	.1000
Dixie 50	lb.	.0600	.1000
Kosmos 50	lb.	.0600	.1000
Statex M	lb.	.0600	.1000
Sterling SO	lb.	.0600	.1000

Furnace, General Purpose (GPF) (bags)

Sterling V	lb.	.0500	.0900

Furnace, High Modulus (HMF) (bags)

Continex HMF	lb.	.0550	.0950
Croflex 40	lb.	.0550	.0950
Dixie 40	lb.	.0550	.0950
Kosmos 40	lb.	.0550	.0950
Modulex	lb.	.0550	.0950
Statex 93	lb.	.0550	.0950
Sterling L	lb.	.0550	.0950

Furnace, Medium Abrasion (MAF) (bags)

Philblack A	lb.	.0600	.1000

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0400	.0800
Croflex 20	lb.	.0400	.0800
Dixie 20	lb.	.0400	.0800
Essex	lb.	.0400	.0800
Furnex	lb.	.0400	.0800
Gastex	lb.	.0450	.0850
Kosmos 20	lb.	.0400	.0800
Pelletex	lb.	.0400	.0800
Sterling NS	lb.	.0400	.0800
Sterling R	lb.	.0450	.0850
Sterling S	lb.	.0400	.0800

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REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, Fine (FF) (bags)

Statex B	lb.	.0650 -	.1050
Sterling 99	lb.	.0650 -	.1050

Furnace, High Abrasion (HAF) (bags)

Aromex	lb.	.0790 -	.1250
Continex HAF	lb.	.0790 -	.1250
Croflex 60	lb.	.0790 -	.1175
Dixie 60	lb.	.0790 -	.1175
Kosmos 60	lb.	.0790 -	.1175
Philblack O	lb.	.0790 -	.1190
Statex R	lb.	.0790 -	.1250
Vulcan 3	lb.	.0790 -	.1220

Thermal, Fine (FT) bags)

P-33 (e.l.)	lb.	—— -	.0350

Thermal, Medium (MT) (bags)

Thermax (e.l.)	lb.	—— -	.0350
Thermax, Stainless (e.l.)	lb.	—— -	.0450

REINFORCING AGENTS—SILICA

Hi-Sil	lb.	.11 -	.12½

REINFORCING AGENTS—MISCELLANEOUS

Darex Copolymer No. 3	lb.	.42 -	.44
X34	lb.	.37 -	.39
X43 (and 43E)	lb.	.38 -	.40
Darex Copolymer Latex No. 3 (and X34)	lb.	.36½ -	.50
Durez 12687 (and 12707)	lb.	—— -	.32
Durez 13355	lb.	—— -	.26
Geon Rite Resin 50	lb.	.42 -	.44
Kralac A	lb.	.39 -	.40
Marbon S and S-1	lb.	.41 -	.48
8000	lb.	.41 -	.48
Marmix	lb.	.41 -	.48
Pliolite Latex 190	lb.	.30 -	.34
Pliolite NR	lb.	.74 -	.76
Pliolite S6 (and S6B) Resin	lb.	.36 -	.37
C-3 Masterbatch	lb.	.47 -	.48
C-4 Masterbatch	lb.	.45 -	.46
G Masterbatch	lb.	.35 -	.36
G50 Masterbatch	lb.	.35 -	.36
N Masterbatch	lb.	.40 -	.41
R Masterbatch	lb.	.43 -	.44
Polyco 220	lb.	.13 -	.13

RETARDERS

Dutch Boy Normasal	lb.	—— -	.4815
ESEN	lb.	—— -	.36
Retarder ASA	lb.	—— -	.55
Retarder PD	lb.	.34 -	.36
Retarder TCM	lb.	—— -	.65
Retarder W	lb.	—— -	.43
Retardex	lb.	.47 -	.50

RUBBER SUBSTITUTES

Mineral Rubber

38	ton	38.00 -	40.00
Black Diamond	ton	38.00 -	40.00
Byerlyte	ton	47.00 -	54.00
Gilsonite, Selects (e.l.)	ton	33.50 -	36.00
Hard Hydrocarbon (dms.)	ton	46.50 -	48.50
Herron Flake	ton	—— -	45.00
Mineral Rubber, solid	ton	42.50 -	44.50
Pioneer	ton	35.00 -	46.00

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.29 -	.36
Brown	lb.	.1425 -	.2680
Dispersed	lb.	.26 -	.42
Neophax	lb.	.1370 -	.2680
White	lb.	.1440 -	.2850

Miscellaneous Rubber Substitutes

G.B. Asphaltenes	lb.	.06 -	.06½
Gilsowax B	lb.	.09 -	.11
Resin No. 1098 (drums)	lb.	—— -	.62
No. 1198	lb.	.46¾ -	.49¾

SOLVENTS

Acetone (dlvd.)	lb.	.08½ -	.11
American Dipentine	gal.	.47 -	.68
American Pine Oil	gal.	.75½ -	.95½
Amsco Lactol Spirits (t.c.)	gal.	—— -	.17
Rubber Solvent (t.c.)	gal.	—— -	.16
Solv A (t.c.)	gal.	—— -	.21½
Solv A-80 (t.c.)	gal.	—— -	.26
Solv B (t.c.)	gal.	—— -	.25
Solv B-90 (t.c.)	gal.	—— -	.28½
Solv D (t.c.)	gal.	—— -	.25¼
Special Naphthalite (t.c.)	gal.	—— -	.16
Textile Spirits (t.c.)	gal.	—— -	.17
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	.10 -	.11
Aromatic Solvent 40	gal.	—— -	.219
Benzol 90%	gal.	.17 -	.24
Butyl Acetate (t.c.)	lb.	.13 -	.175
Butyl Alcohol (t.c.)	lb.	.13 -	.175
Secondary (dlvd.)	lb.	.11 -	.13½
Tertiary (dlvd.)	lb.	.12 -	.14½
Carbon Bisulfide, Tech.	lb.	.0440 -	.0800
Carbon Tetrachloride	lb.	.08 -	.08½
Cosol 1	gal.	.30 -	.38
Cosol 2	gal.	.30 -	.38
Cyclohexane	lb.	.09¼ -	.11¾
Cyclohexanone	lb.	.25 -	.27 *
Diacetone, Pure (dlvd.)	lb.	.12 -	.14½

SOLVENTS (Cont'd)

Dichlorethyl Ether (dms.)	lb.	.165 -	.17
Formal (dms.)	lb.	.265 -	.27
Dichloropentane (l.c.l.)	lb.	.04 -	.07
Dicom	gal.	.30 -	.42
Dipentene 122 (dms.)	gal.	.35 -	.36
Halowax Oil	lb.	.25 -	.37
Heptanes (t.c.)	gal.	.17 -	.22
Hexalin Cyclohexanol	lb.	.20 -	.22 *
Hexanes (t.c.)	gal.	.17 -	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.47 -	.64
Ether, Ref. (dlvd.)	gal.	.05 -	.07½
Mesityl Oxide (dlvd.)	lb.	.11½ -	.14
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.615 -	.65
Methyl Ethyl Ketone	lb.	.11 -	.13½
Methyl Isobutyl Ketone (dlvd.)	lb.	.13 -	.15½
N-5 Pentane Mix. (t.c.)	gal.	—— -	.13½
N-6 Hexanes (t.c.)	gal.	—— -	.14
N-7 Hexanes (t.c.)	gal.	—— -	.13
Penetrell	gal.	.47 -	.68
Petrolene (t.c.)	gal.	—— -	.13125
Picolines, Alpha, Refined	lb.	—— -	.40
Mixed	lb.	—— -	.30
Proprietary Alcohol (t.c.)	gal.	—— -	.43½
Pyridine, Refined	lb.	—— -	1.05
Quinoline	lb.	—— -	.61¾
Rubber Solvent (t.c.)	gal.	—— -	.16
Rubsol (t.c.)	gal.	—— -	.11875
Skellysolve B (Hexanes) (t.c.)	gal.	—— -	.148
C (Heptanes) (t.c.)	gal.	—— -	.141
E (Octanes) (t.c.)	gal.	—— -	.155
R (Solvent Naphtha)	gal.	—— -	.114
Solvenol (dms.)	gal.	—— -	.36
Solvent, Crude, Light	gal.	.19 -	.28
Solvesso 100 (t.c.)	gal.	—— -	.28
150 (t.c.)	gal.	—— -	.28
Sunny South Dipentine	gal.	.47 -	.68
Sunny South Pine Oil	gal.	.75½ -	.95½
Toluene (drums)	gal.	—— -	.28
Toluol (t.c.)	gal.	—— -	.30
Trichlorethane	lb.	.11 -	.12
Triglycol Dichloride (dms)	lb.	.53 -	.54
Tromex	lb.	.078 -	.083
Union Thinner 1	gal.	—— -	.161
3	gal.	—— -	.161
7	gal.	—— -	.151
2-50-W Hi-Flash	gal.	—— -	.38
X-7 Sp. Heptanes (t.c.)	gal.	—— -	.11

STABILIZING AGENTS (for Vinyl Resins)

Basic Silicate White Lead	lb.	.1715 -	.1815
No. 201	lb.	.2371 -	.2371
BVS	lb.	—— -	.5834
Cadmium Stearate	lb.	—— -	1.25
Dutch Boy DS-207	lb.	—— -	.56
Plumb-O-Sil A	lb.	—— -	.3134
B	lb.	—— -	.3234
Tribase	lb.	—— -	.2934
Dythal	lb.	—— -	.4234
Lead Stearate, Precip.	lb.	.36 -	.38
Fused	lb.	—— -	.3534
Lithium Stearate	lb.	.63 -	.65
Stabelan E	lb.	1.25 -	1.40
XL	lb.	.55 -	.65
Stabilizer No. 3	lb.	—— -	2.00
Stabilizer No. 21	lb.	—— -	.90
Stabilizer No. 52	lb.	—— -	2.00
Stabilizer E6B	lb.	—— -	.85
Stabilizer JCX	lb.	—— -	.49
Stabilizer L	lb.	—— -	.60
Stabilizer SN	lb.	—— -	.42
Stabilizer V-1-N	lb.	—— -	.50
Stabilizer V-9	lb.	—— -	.85
Stabilizer V-7939	lb.	—— -	.60
Vanstay L	lb.	.33 -	.35
H	lb.	.75 -	.77

STIFFENING AGENTS

Calco S. A.	lb.	.85 -	.88

SUN CHECKING AGENTS

Antisol	lb.	—— -	.23
Antisun	lb.	—— -	.21
Heliozone	lb.	.25 -	.26
Sharples Wax	lb.	.23 -	.28
Sunolite	lb.	.20 -	.23
Sunproof	lb.	.25 -	.26
Imp.	lb.	.23 -	.24
Jr.	lb.	.18 -	.19
Tonox	lb.	.50 -	.52

TACKIFIERS

Advaresin 100	lb.	.13½ -	.14
Arcco 493-49B	lb.	.15 -	.17
700-25A	lb.	.14 -	.16
U2-74	lb.	.11 -	.13
Galex (drums)	lb.	.15½ -	.19¼
Indopol H-300 (bbls.)	gal.	1.12 -	1.16
Koresin	lb.	.73 -	.75
Liquid Rubber Flux	lb.	—— -	.14
Nilox	cwt.	12.50 -	13.50
Pentalyn A (dlvd.)	lb.	.12½ -	.13
Resin V	lb.	—— -	.23¼
Rubtack	lb.	—— -	.12
Staybelite Ester No. 10 (dlvd.)	lb.	.19¾ -	.20¼
Synthol	lb.	—— -	.24¼
Vistac No. 1	gal.	1.00 -	1.16
No. 2 (e.l.)	gal.	1.22 -	1.26
No. 4 (e.l.)	gal.	1.32 -	1.36
A	lb.	—— -	.20¾
Zirex	cwt.	12.00 -	12.80

THICKENERS (FOR LATEX)

Alcogum AN-6	lb.	—— -	.05
AN-10	lb.	—— -	.08½
Betanol (drums)	lb.	—— -	.70
Emulsorex No. 5	lb.	—— -	.35
Lecithin	lb.	.13 -	.17
Modicol VD	lb.	—— -	.12½
VE	lb.	—— -	.10¾
VF	lb.	—— -	.10¾
VK	lb.	—— -	.07
Polyco 296	lb.	.13 -	.13½
Propylene Laurate (dms.)	lb.	.57 -	.67
Sodium Silicate	cwt.	1.50 -	2.65

VULCANIZING AGENTS

Selenium

Ancasal*	lb.	—— -	2.00
Vandex	lb.	—— -	3.50

Sulfur

Blackbird	cwt.	—— -	2.30
Crystex	lb.	.19½ -	.23
Darex Dispersed Sulphur	lb.	.12 -	.17
Dispersed Sulfur	lb.	.12 -	.14
Devil (e.l.)	cwt.	—— -	1.75
Insoluble Sulfur 60	lb.	.12½ -	.13
Spider	cwt.	—— -	2.30
Star (e.l.)	cwt.	—— -	2.25
Tire (e.l.)	cwt.	—— -	1.75
Tube	cwt.	—— -	2.25

Tellurium

Ancatel*	lb.	—— -	2.00
Telloy	lb.	—— -	2.50

WASHING & FINISHING AGENTS

Apcolene (t.c.)	gal.	—— -	.12375

WETTING AGENTS

Advawet No. 10	lb.	—— -	.35
No. 15	lb.	—— -	.20½
No. 33	lb.	—— -	.39
Aerosol OT 70% Clear	lb.	.80 -	1.00
Alrosol (dms.)	lb.	—— -	.40
Alrosperse	lb.	—— -	.18
Aquarex D	lb.	—— -	.80
MDL Paste	lb.	—— -	.33
ME	lb.	—— -	.97
NS	lb.	—— -	.60
WA Paste	lb.	—— -	.28
Areskap 50	lb.	.30 -	.38
Dry 100	lb.	.60 -	.72
Aresket 240	lb.	.30 -	.38
Dry 300	lb.	.60 -	.72
Aresklene 375	lb.	.42 -	.57
Dry 400	lb.	.70 -	.84
Armacs	lb.	.29 -	.76
Arquads	lb.	.21 -	.61
Ethochemicals	lb.	.33 -	.80
Lecithin	lb.	.18 -	.26
Modicol L	lb.	—— -	.58
N	lb.	—— -	.40
S	lb.	—— -	.22
Nopco 1086-A	lb.	.42 -	.50
1187-X	lb.	—— -	.14½
Parnol	lb.	.13 -	.18
Santomerse D	lb.	.44 -	.65
S	lb.	.13 -	.25
Sorbit P	lb.	—— -	.25
Stablex G	lb.	.50 -	.70
Tergitol 4 (dms., dlvd.)	lb.	—— -	.30
7 (dms., dlvd.)	lb.	—— -	.37
O8 (dms., dlvd.)	lb.	—— -	.30
P28 (dms., dlvd.)	lb.	—— -	.19
Trenamine W-30	lb.	—— -	.15
Vultamol	lb.	—— -	.17½
Wetsit Conc.	lb.	.25 -	.32

MISCELLANEOUS CHEMICALS

Acto 450 (550-W, 600, 630)	lb.	.109 -	.145
Agchem SA-17	lb.	—— -	.29
Aquarex SMO	lb.	—— -	.56
A.S.T.M. Oil No. 1 (and No. 3)	gal.	1.00 -	1.15
Copper Inhibitor X-872-L	lb.	—— -	1.95
D-Tac	lb.	.21 -	.23
2-Ethylhexanol (dms.)	lb.	.25 -	.26
MODX	lb.	.295 -	.345
NBC	lb.	—— -	1.50
Para Resin No. 2457 (e.l.)	lb.	—— -	.04
No. 8718 (e.l.)	lb.	—— -	.04
Pigmented Filmite	lb.	—— -	.16½
Polyvinyl Methyl Ether	lb.	—— -	1.00
Reference Fluid SR-6	gal.	.85 -	1.00
SR-10	gal.	.60 -	.75
Resin No. 1226	lb.	.31½ -	.36½
Rio Resin	lb.	.52 -	.54
RR-10	lb.	—— -	.35
Santocel	lb.	—— -	.50
Sherosope L, N, F-445 and P	lb.	.12½ -	.15
Sublac B2	lb.	.26 -	.28
PX-5	lb.	.26 -	.28
Syspep N (drums)	lb.	—— -	.54
Thiokol LP-2	lb.	—— -	.96
LP-3	lb.	—— -	.96
LP-8	lb.	—— -	1.25
Tysonite	lb.	.24 -	.24¾
Vanfre	gal.	2.50 -	3.00
Vinsol Resin—Lumps	cwt.	—— -	3.25

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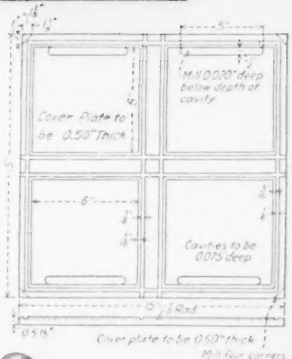

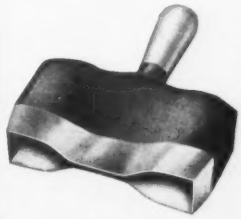

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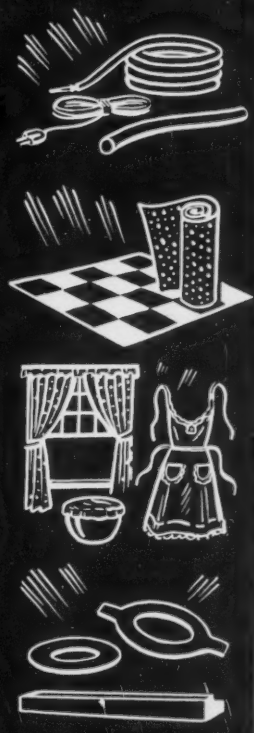

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